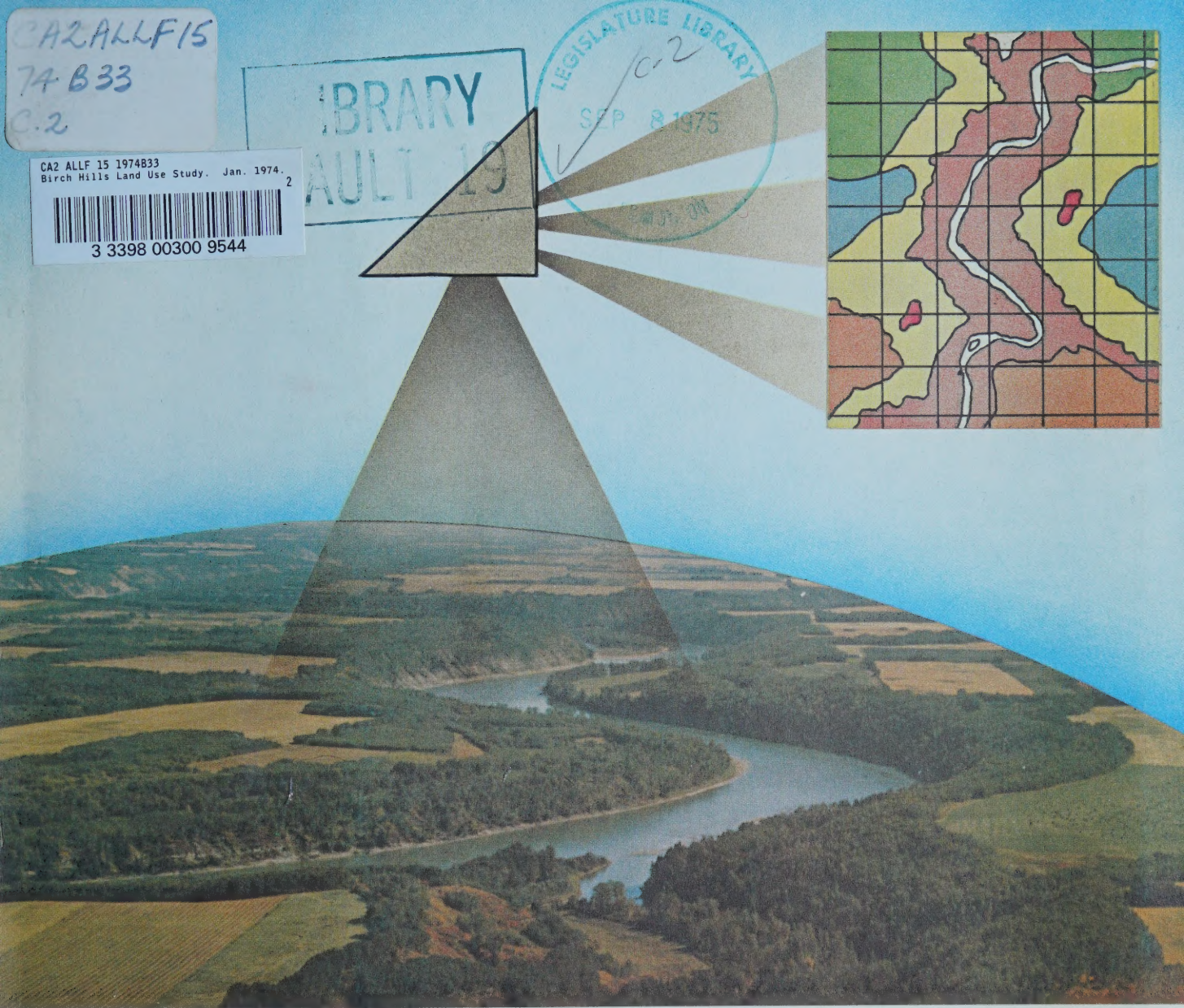




BIRCH HILLS LAND USE STUDY

Alberta

LANDS AND FORESTS

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...today

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LAND USE PLAN FOR THE BIRCH HILLS AREA

BY THE

LAND USE ASSIGNMENT COMMITTEE

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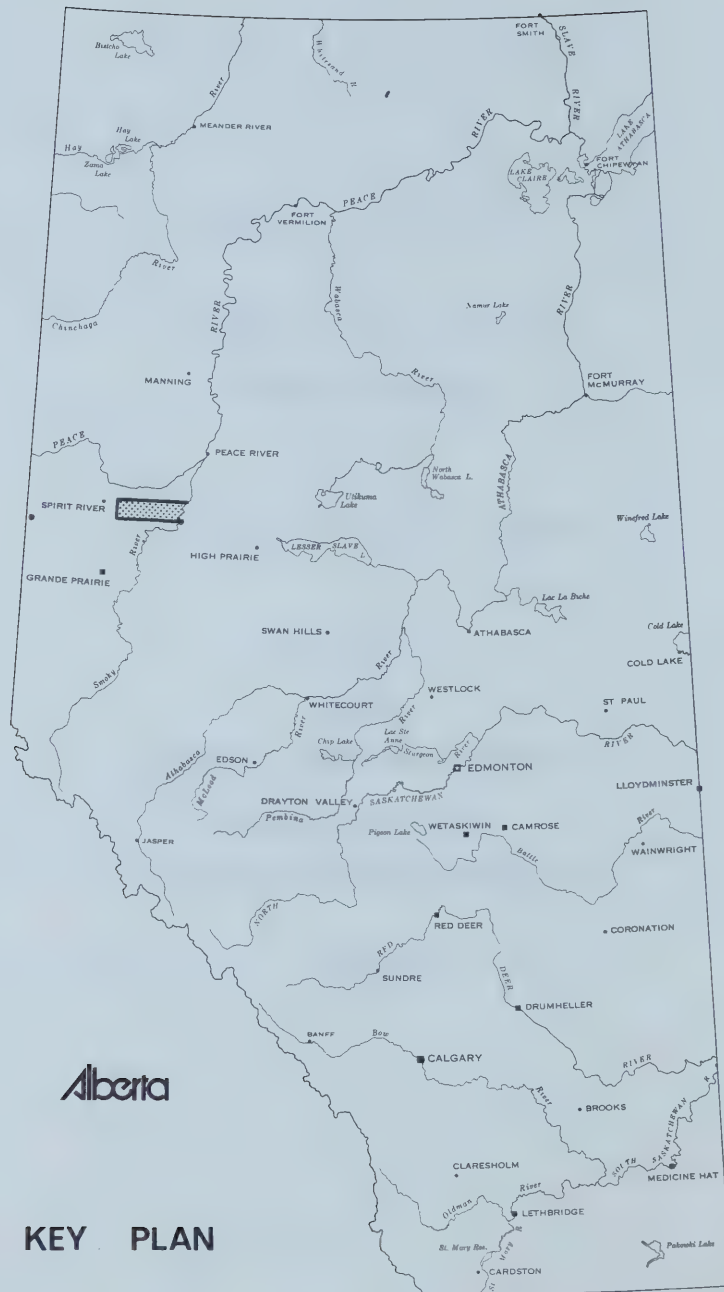
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BIOPHYSICAL ANALYSIS
and
EVALUATION OF CAPABILITY
BIRCH HILLS AREA

Prepared for
LAND USE ASSIGNMENT COMMITTEE

by
C. VAN WAAS
of the
LAND USE ASSIGNMENT SECTION
TECHNICAL DIVISION
ALBERTA LANDS AND FORESTS

June, 1971



LOCATION

The study area is located in the Alberta section of the Peace River Block. It encompasses Township 77 and 78 from the Smoky River in Range 24 west of the Fifth Meridian to Highway 2 in Range 5, west of the Sixth Meridian, a total of slightly over 14 townships.

The area is traversed in an east-west direction by Highway 49 and the Northern Alberta Railway.

CLIMATE

Several papers have been written about the climatic conditions of the Peace River Country.¹ Most data are collected for the agricultural industry and therefore are directly related to field crops. However, much of the information can be utilized for forest and wildlife management and the planning of outdoor recreation.

In terms of forestry regions, most of the study area is situated in the Aspen-Grove section of the Boreal Forest² which indicates a critical moisture supply during the growing season and/or a regular fire frequency through history. The Aspen-Grove section is an area of forest-grassland transition which correlates with the Black and Dark Gray soil zones.

Canada Land Inventory Report No. 3 (1966) classifies the study area as 6G and 7G climatic regions. The numeral relates to temperature zone, while the letter gives the moisture class. There are a total of seven temperature zones across Canada which are defined in terms of average number of degree-days above 42 degrees Fahrenheit and average length of frost-free period.³

Class 6 has 1800-2000 degree-days and 75-90 frost-free days.

Class 7 has less than 1800 degree-days and less than 75 frost-free days.

The moisture classes are divided into nine categories and class G has a summer (May to September) precipitation of 10-13 inches with a water deficiency of 5-3 inches. This classification of climate can only be appreciated if compared with other regions, or a known "bench mark."

The Windsor area in southwestern Ontario is classified as a 1G area. The Edmonton area is a 5G and the Lacombe area 6H. The Lacombe area receives an equal amount of heat units (degree-days) as most of the Peace River area; however, the summer rainfall is one class higher. Summer rainfall is significant in vegetation growth.

The 6G Canada-wide classification corresponds with the Alberta Agro-climatic Area 2H. The Agro-climatic zones for Alberta were compiled by W. Earl Bowser of Canada Department of Agriculture with the co-operation of the Alberta Soil Survey.⁴

In general it can be said that most of the Peace River Block, including the study area, is capable of producing wheat and coarse grains, alfalfa and various grasses, especially seed; rape and flax seed. The greatest climatic limitation is erratic rainfall through the growing season. In most years the influence of snow melt is negligible due to frozen soil conditions.⁵

The climatic trend for higher elevations to receive more moisture, as described by G. H. Muttitt,⁶ holds true for the Birch Hills. Codesa forestry tower records show a persistent 2" higher summer rainfall than in the surrounding

1. *The Peace River Country*, Department of the Interior, National Development Bureau, 1930; A. C. Carder, Canada Department of Agriculture publication 1224; A. C. Carder, "Northwestern Canada's Climate: Its Effect on Crop Growth and Development," in *Agricultural Institute Review*; Wm. Odynsky and J. D. Newton, *Soil Survey of the Rycroft and Watino Sheets*, report no. 15 of the Alberta Soil Survey, Department of Extension, University of Alberta

2. J. S. Rowe, *Forest Regions of Canada*. Bulletin 123, Department of Northern Affairs and National Resources

3. *The Climates of Canada for Agriculture*. Department of Forestry and Rural Development

4. This information is printed in map form by the Cartographic Section, Soil Research Institute Research Branch Canada Department of Agriculture, 1967.

5. Wm. Odynsky et al., *Soil Survey of the Beaverlodge and Blueberry Mountain Sheet*. Report no. 20 of the Alberta Soil Survey, Department of Extension, University of Alberta, 1961

6. "Spring and Summer Rainfall Patterns in Alberta." Circular 3512 of the Meteorological Branch, Alberta Department of Transport, July 12, 1961

lowland. This moisture advantage combined with cooler daytime temperatures (fewer heat units at higher elevation) is advantageous for vigorous forest growth and detrimental to cultivated crops.

GEOLOGY AND PHYSIOGRAPHY

Bedrock Geology

The gradient of the general landscape in Alberta dips towards the northeast. A horizontal line drawn from Grande Prairie to Fort Chipewyan shows an elevation difference of 1,475 feet. Sedimentary formations are usually horizontal or show a slight dip which seldom exceeds a few degrees. It stands to reason, then, that in a northerly direction successive formations will surface. Only erosion-resistant formations will have a surface expression noticeable in the landscape.

The Birch Hills are considered a pre-glacial erosion remnant and are classified as part of the Wapiti Formation. This formation consists of fresh-water sandstone, shales and coal seams and at this location has a dip to the south of approximately 40 feet per mile.

The southern part of the study area, mainly Township 77, belongs to the Puskwaskau formation, which is made up of marine dark gray shale. An iron rich oolitic sandstone formation, the Bad Heart, crops out occasionally and separates Puskwaskau from the lower Kaskapau formation. This formation covers the northern half of the area. It is of marine origin and contains dark gray shale, silty shale and sandstone.

Surficial Geology

Most of the protective sandstone layer covering the Birch Hills, had eroded before the Wisconsin (latest) glaciation, causing the underlying soft shales to erode, which resulted in long, even southerly slopes. Subsequent glaciation covered the hills with till and deglaciation resulted in a till upland with a shallow apron of alluvial material on the lower reaches of the slopes and the surrounding lowland.

An area of deltaic deposits, associated with the Smoky River, covers the eastern third of the study area. From south to north this deposit gradually changes from windblown sand to fine lacustrine sediments. North of this basin the

country has a humpy topography with numerous depressions. This deposit is very silty. The landscape is associated with the broad Peace River Valley.

Natural Features and Topography

The most prominent natural feature in the study area is the Birch Hills. This range of hills has an east-west axis and a north-facing escarpment. The south slopes are gentle, with a few minor exceptions where sandstones resisted erosion. The general elevation above the lacustrine plain is approximately 550 feet at Codesa forestry tower and 450 feet south of the village of Wanham. (See diagram on page 3.)

The plain is very level with a slight dip towards the east. Elevation at Rycroft railway station is 1986, at Tangent 1819 feet. The stations between record 1970, 1964, 1946, 1881, 1872 and 1880 feet above sea level.

The Birch Hills form the divide between the Peace and Smoky Rivers close to their junctions. The deltaic sands to the east of the hills were transformed into an area of dunes. The finer-textured sands and silts can be classified as "pitted deltaic." The knolls in this area are steep-sided and numerous small potholes occur. Several drainage ditches have been constructed in this area.

The silty lacustrine deposits in the north half of the study area have a pronounced hummocky topography, very similar to the pitted deltaic deposits.

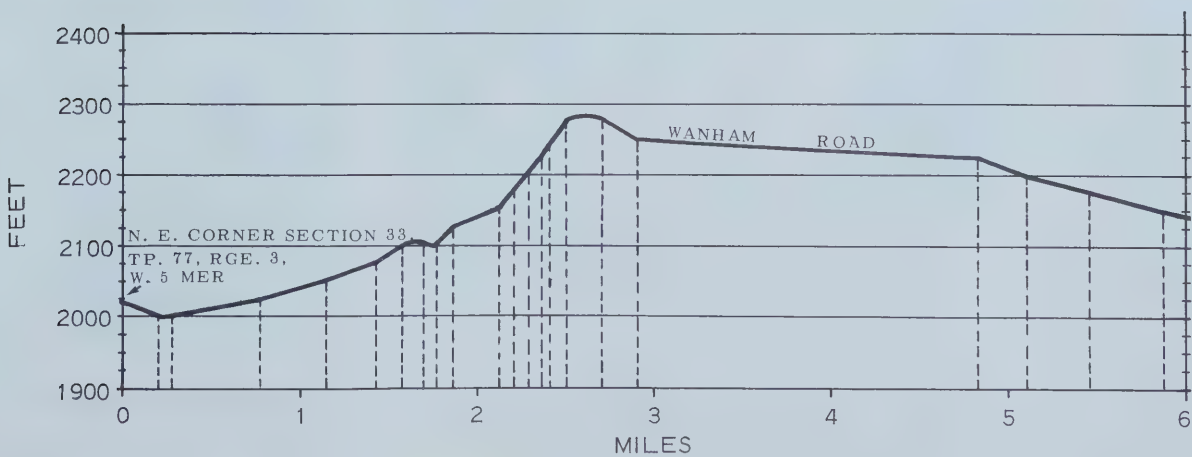
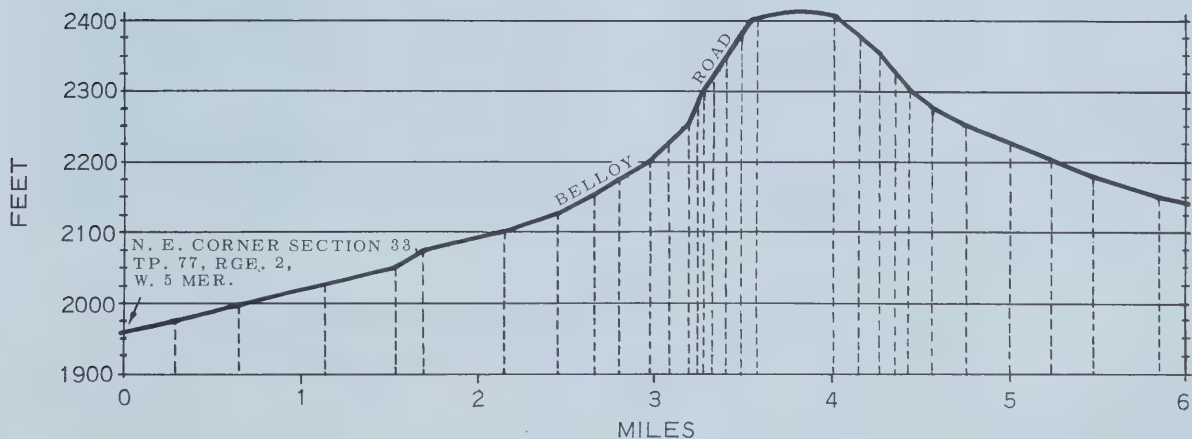
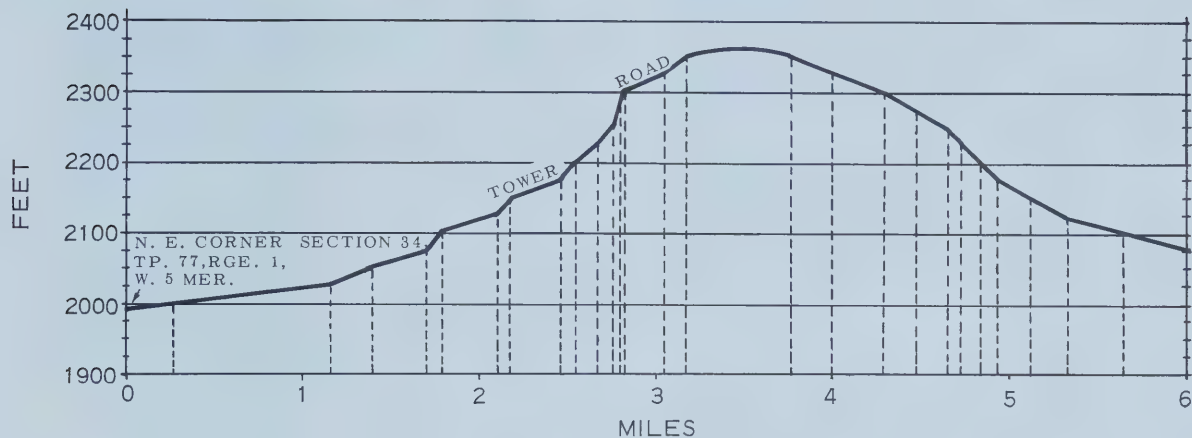
The erosion channel of the Smoky River in Township 77 and 78 shows signs of maturity. The river flows 500 feet below the general upland, makes wide loops and has built extensive flats. E. P. Henderson reports that this stretch of the present day valley is of Tertiary origin.¹

Prominent gravel terraces are found approximately 140 feet above the present valley bottom. These terraces were observed at Watino (picture No. 1) and at a location three miles upstream from this point.

1. *Surficial Geology of Sturgeon Lake Map Area*. Memoir 303 of the Geological Survey of Canada. Queen's Printer (Ottawa)

NORTH-SOUTH CROSS-SECTIONS OF THE BIRCH HILLS

Horizontal Scale: 1"=1 Mile Vertical Scale: 1"=250 Feet



Drainage

The study area is drained by numerous intermittent creeks, which are tributary to the Peace River to the north and to the Smoky River to the south. The Burnt River with its prominent valley is the major watercourse traversing the western part of the area.

The alluvial deposits at the base of the Birch Hills appear to absorb most of the runoff and discharge enough water to feed the numerous creeks until early summer.

A number of drainage ditches and large culverts facilitate a rapid spring runoff in the deltaic deposits of the eastern part of the study area and have partially drained the large flooded area south of Eaglesham.

WATER RESOURCES

The east-west range of hills in the study area form the divide between Kakut Creek and Smoky River to the south and the Peace River to the North. All creeks originating on the hills are intermittent in character, and stream flow is dependent on spring runoff and summer rainfall.

The Saddle (Burnt) River, originating in the Saddle Hills, flows along the western base of the Birch Hills towards the Peace River. By late summer its flow is reduced to a trickle and a series of puddles is all that remains.

The Smoky River has its headwaters on the continental divide in the vicinity of Mt. Robson

and is glacier-fed. Water volume is high during summer, but tapers off during fall, when temperatures in the mountains start dropping.

The Smoky empties in the Peace a couple of miles upstream from Peace River town.

Several seepage areas of springs exist on the north-facing escarpment of the hills. The dip of the shallow sandstone deposit is towards the southwest. Therefore existing springs are of low capacity, because they represent local bedrock disruptions. Only one spring, on the road south of Belloy, is developed and used by local farmers for drinking water.

The villages of Wanham and Eaglesham depend on spring runoff for their water supply. Both have a water basin which is replenished during spring breakup. The basins are lined with coarse sand and gravel which act as a filtering agent, and the water is chlorinated.

LAND RESOURCES

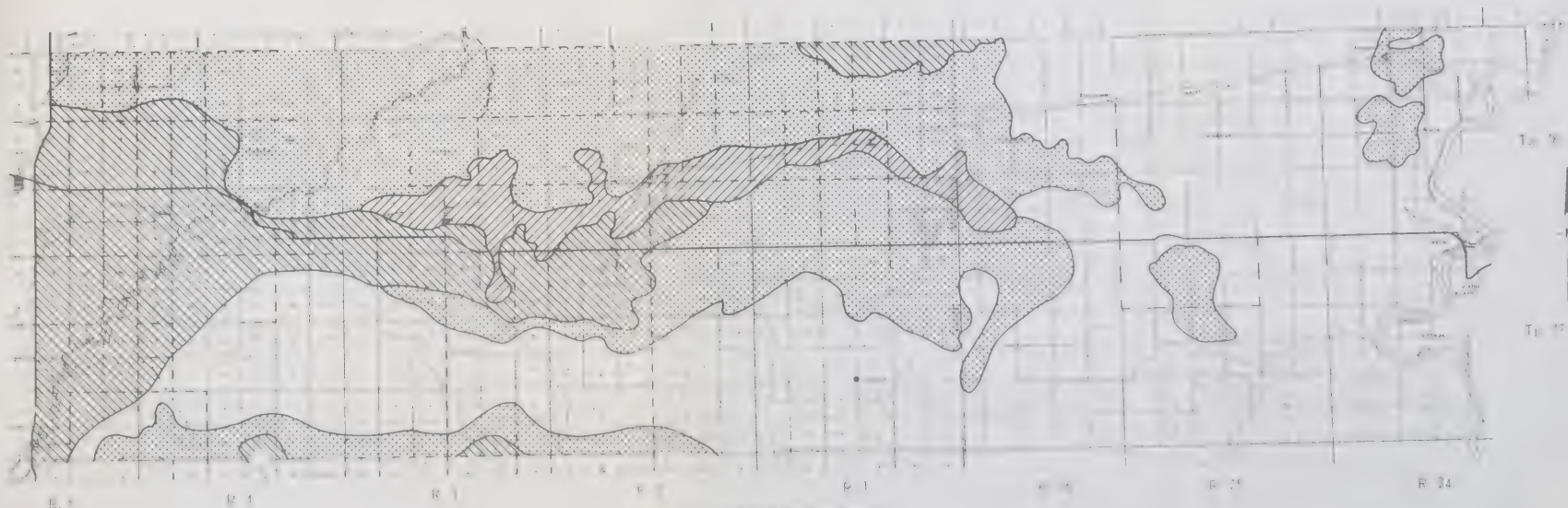
Soil Conditions

Soils are the result of an interplay of the forces of climate and time on parent material, topography and vegetation. Soil development is a continuous process. The main parent materials, lacustrine clays, humpy silty deposits, sandy to silty deltaic deposits and the till upland developed under these materials influences chernozemic, podzolic and gleysolic profiles. The percentage distribution of these soils is given in Table I.

TABLE 1
LAND DISTRICTS AND SOIL CLASSIFICATION (see Map 1)

Land District	Parent Material	Chernozemic Order	Podzolic Order		Gleysolic Order
			Dark Grey Wooded	Grey Wooded	
I	Till Lacustrine Water- and wind-sorted Organic Humpy, Silty, Lacustrine	X		X	
II					
III			X	X	
V					
VI			X		X

BIRCH HILLS



NOTE:
This map is comprised of portions of
Alberta Base Maps 63M N.E. and
63N N.W., therefore all symbolization
is standard for Alberta Base Maps.

W. of 6th Meridian

SOIL ZONE MAP

W. of 5th Meridian

-  Chernozemic Order
-  Podzolic Order Dark Gray Wooded (some Dark Gray)
-  Podzolic Order Gray Wooded
-  Gleysolic Order

Alberta

map prepared by
Land Use Assignment Section
Technical Division

Prepared by Mark H. Lewis	Preliminary	Final
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The soil orders are described as follows:

Soils of the *Chernozemic Order* are well- to imperfectly-drained soils developed under grassland or under grassland-forest vegetative cover and are characterized by a dark-colored, humus-mineral surface horizon. Recognition of the differences in color of the Ah horizon provides a basis for separating soils in this order into the Black and Dark Grey great groups. Further separations are made on the basis of the characteristics of the horizons providing for a grouping at the subgroup level of categorization. Thus, those profiles that are accepted as normal or standard for the great group are grouped as Orthic. Those that show some evidence of leaching through the occurrence of a thin Ae horizon are referred to as Eluviated Black. Similarly those profiles that show some evidence of Solod or Gleysol development are placed in the Solodic and Gleyed subgroups.

Soils of the *Luvissolic Order* are well- to imperfectly-drained soils developed in a moderately cool climate under a forest vegetation. They are characterized by a profile containing an organic surface horizon that contains an accumulation of organic matter, sesqui-oxide, or clay (Bh, Bf, Bt), or any combination of these. In this region the main accumulation product is clay, permitting a grouping into the Grey Wooded great group. While there is usually a thin Ah horizon in the Orthic Grey Wooded profile, similar profiles having an Ah horizon usually thicker than 2 inches are placed in the Dark Grey Wooded sub-group. Representatives of both of these sub-groups are of common occurrence in the study area.

Soils of the *Gleysolic Order* are associated with wetness. They have been developed under various climatic and vegetative conditions in the presence of a high or a highly fluctuating water table. These soils may have an accumulation of peat not exceeding a compact thickness of 12 inches and are characterized by dull grayish colors throughout the profile which may be accompanied by the presence of prominent yellowish or reddish mottles. The characteristics of the A horizon provide a guide to grouping at the great group level. Thus, the Humic Gleysol great group consists of soils that have an Ah horizon that is more than three inches in thickness, whereas the Eluviated Gleysol great group is characterized by a prominent Ae horizon.

Topography has a marked influence on soil development. Gently rolling (slopes of 5-9%), choppy humpy topography is found in 27% of the area, 6% has rolling (slopes of 9-15%) humpy topography. Map 2 shows the location of the topography classes. The Birch Hills have mainly single slope classes. The plains are characterized by multiple slope topography. Low areas surround the humps. The crown may be excessively drained, resulting in minimal profile development, while the depressional areas are badly leached and classified as gleysolic soils. Increased steepness of slope will aggravate this condition, and, depending on porosity of soils and underlying formations, results in ponding.

The deltaic deposits appear to be underlain by shales, which sometimes outcrop in the deeper road ditches (5-6 feet below lowest land surface). This impervious sublayer has created a perched water table, extending flooding conditions of low spots well into early summer. The Department of Agriculture, Water Resources Division has improved drainage with the construction of several drainage ditches in this area.

Land Classification

The land classification system used for this report is based on extensive research and publications by the Ontario Department of Lands and Forests.

In order to assess adequately the resource potential of a study area, the area must be subdivided into like units. As there is variability in climate, topography, soil texture and drainage patterns, the capability of various units to produce a crop (farm, timber, wildlife, waterfowl, or recreation) will seldom be the same.

The subdivisions adopted are Land Region, Land District, and Land System.

Land Region: Different writers have given different names to the region in which the study area is located. J. S. Rowe in his Forest Regions of Canada talks about the Aspen-Grove section. The atlas of Alberta, 1969, page 9, mentions the Peace River Lowland and the Wapiti Plain for the Birch Hills. J. T. Nalbach in his Multiple Resource Management Planning Guide describes the area as being part of the Peace River Parkland Region. Climatic conditions show little variance in the study area and therefore no

subdivisions were made on the Land Region Level. (For purposes of this study the area is considered to belong to the Mixed Wood Section of the Boreal Forest Region).

Land District: The land districts are based on the physiography, geology, and relief of the area. Lacustrine plains, till uplands, alluvial deposits, areas of bedrock outcroppings, and erosion valleys are outlined. Information from soil and surficial geology surveys aids in further separation into shallow lacustrine and shallow alluvial overlays or a separation between lacustrine clays and silts. Type of topography and drainage is usually closely associated with types of surficial deposit.

Land System: The land district appeared too coarse a unit for allocating resource uses. Topographic differences, changes in soil texture and soil profile development made a finer subdivision necessary. The land system was introduced. Parcels of land within this system have to conform as to parent material, soil classification, drainage, percentage of slope and vegetation.

This bio-physical classification is described in the following pages. The district map is prepared from this information.

Land District I: Till Plains

This land district consists of the upland till plain of the Birch Hills. It is generally believed that the glaciers plastered till over the underlying uneven pre-glacial surface, resulting in a variable thickness of drift. The till is derived from the Wapiti and Smoky River formation. It has some stones, coal flecks and its texture is dominantly a clay loam. Regional vegetation is a mixture of trembling aspen and white spruce with black spruce restricted to depressional areas.

Land System Ia

Physiography: This land system has undulating to gently rolling topography. The soils are Grey Wooded, fine- to medium-textured and moderately well drained.

Soil Association: Braeburn

Present use: Woodland mainly

Natural cover: Mainly aspen with isolated stands of spruce-aspen

Agro-climatic zone: 2 Ch

Ratings:

Agriculture	3 S
Forestry	4 M
Ungulates	3 T F
Recreation	5 O E
Waterfowl	6 T

Land System Ib

Physiography: This land system has gently rolling simple topography. It is characterized by discontinuous alluvial overlay which covers up to 40% of the system. The soils are Grey Wooded, fine to medium textured for the till and medium to coarse textured for the alluvial overlay. Drainage is moderately well.

Soil Association: Braeburn, Codesa

Present use: Agriculture and woodland

Natural cover: Aspen and aspen-spruce on areas not cleared

Agro-climatic zone: 2 Ch

Ratings:

Agriculture	3 S
Forestry	4 M
Ungulates	3 T M
Recreation	6 W O P
Waterfowl	6 T

Land System Ic

Physiography: This land system consists of the steeper slopes of the Birch Hills. Reddish sandstone crops out frequently. Slopewash occurs on the lower slopes. Soils are Grey Wooded, fine- to medium-textured and moderately well drained.

Soil Association: Braeburn and minor Rahab

Present use: Woodland and minor agriculture

Natural cover: Aspen-spruce

Agro-climatic zone: 2 Ch

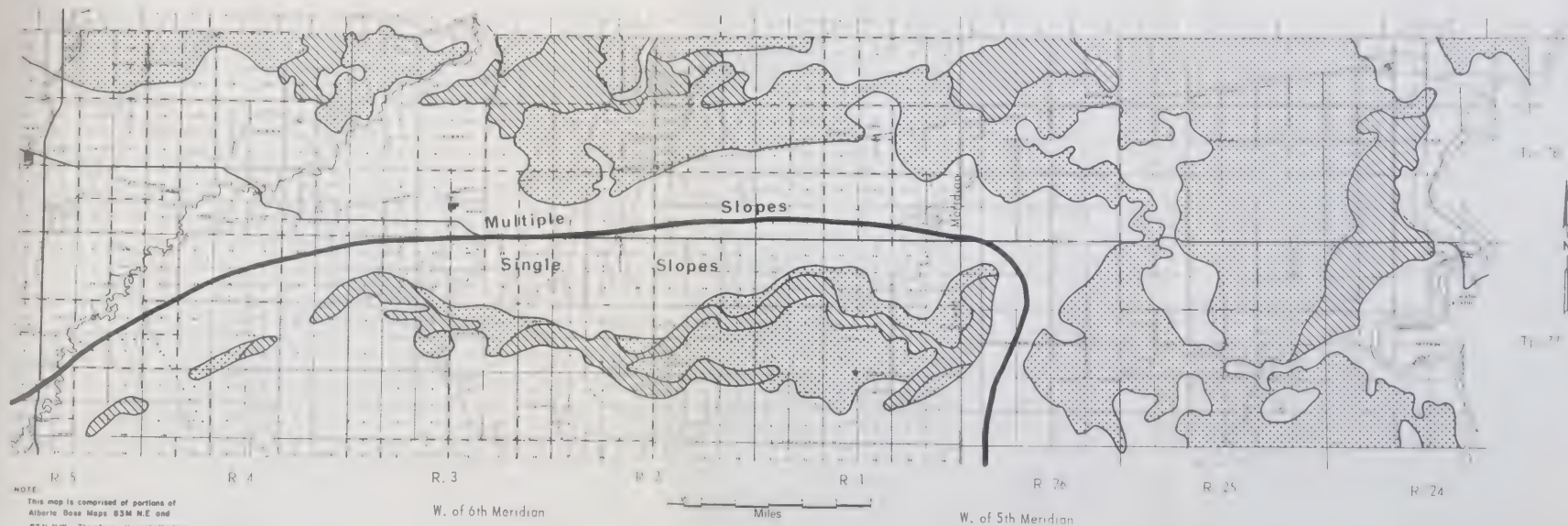
Ratings:

Agriculture	5 T
Forestry	4 M
Ungulates	2 F
Recreation	5 O O E
Waterfowl	6 T

Land District II: Lacustrine Plains

This land district is characterized by low relief, featureless lacustrine plains. It occurs at elevations below 2200 feet A.S.L. Regional vegetation is sparse woodland with native grasses.

BIRCH HILLS

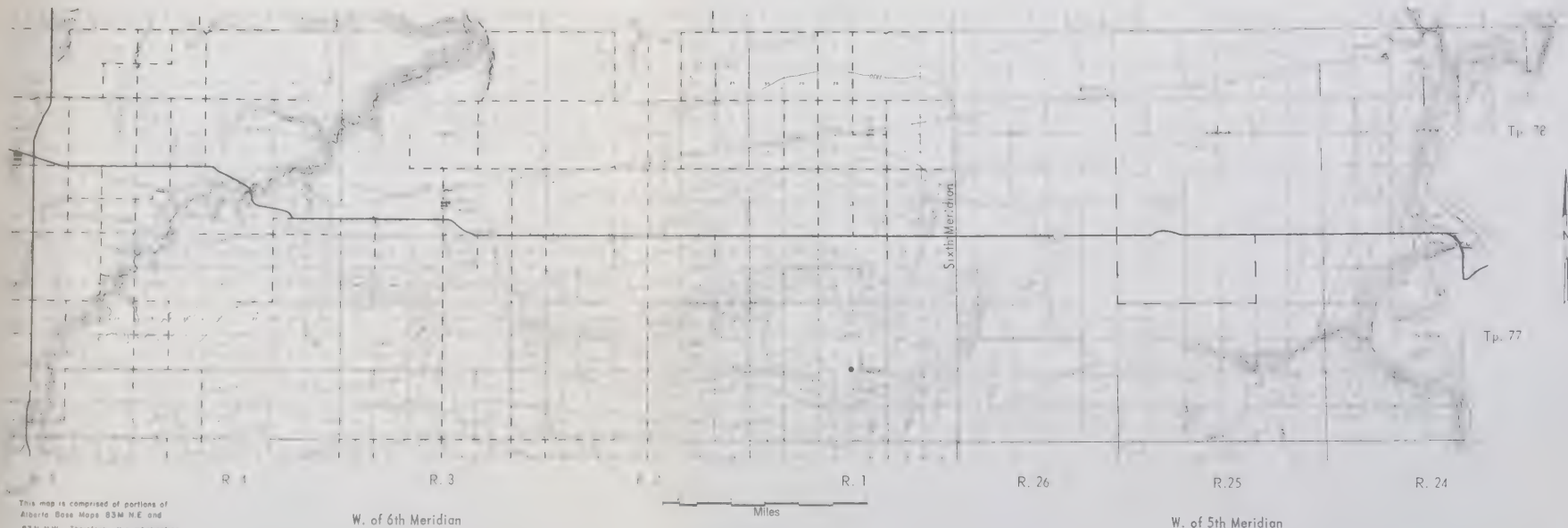


TOPOGRAPHY CLASSES

-  Gently Rolling
-  Rolling and Hilly

		
map prepared by Land Use Assignment Section Technical Division		
Prepared by <i>John W. 10/5/54</i>	Preliminary -----	Final -----

BIRCH HILLS



This map is comprised of portions of
Alberta Base Maps 83M N.E. and
83N N.W. Therefore all symbolization
is standard for Alberta Base Maps

Miles

TOPOGRAPHY
50 Ft. Contour Interval

Alberta
LANDS AND FORESTS

map prepared by
Land Use Assignment Section
Technical Division

E. Van Weas

Preparation

Final



Picture 1. Land System Ia. Recent clearing in SE22-77-1-W6.



Picture 2. Land System Ic and Land System IIIg.



Picture 3. Ground cover vegetation as found on Birch Hills escarpment in NE27-77-1-W6. Land System Ic.



Picture 4. Potable water is precious. Spring on Belloy Road. Land System Ic.

Land System IIa

Physiography: Level to gently undulating clay to clay loam. The soils are Black Solods. They are imperfectly drained.

Soil Association: Rycroft, Fahler

Present use: Agriculture

Natural cover: Parkland vegetation with coarse salt-tolerant grasses, willow, alder and poplar.

Agro-climatic zone: 2 Ch

Ratings:

Agriculture	2 C
Forestry	4 D M (5 D M)
Ungulates	2 M F—3 T M
Recreation	6 W O P
Waterfowl	5 T—6 T

Land District III: Alluvial Plains

This land district is characterized by water and wind sorted, often stratified material. They are mainly of deltaic origin and overlie lacustrine or shale deposits. Most of the land district has a humpy topography with associated wet spots. Regional vegetation consists of aspen, pine, spruce, shrubs and native grasses.

Land System IIIa

Physiography: This land system consists of undulating to gently rolling, medium-textured, well to imperfectly drained soils. The soils are Orthic and Eluviated Black and minor Grey Wooded.

Soil Association: Belloy, Codesa

Present use: Agriculture

Natural cover: Parkland vegetation with native grasses, shrubs and poplar.

Agro-climatic zone: 2 Ch

Ratings:

Agriculture	3 S
Forestry	4 M
Ungulates	2 M T, 3 T M
Recreation	6 W O P
Waterfowl	6 T

Land System IIIb

Physiography: This land system consists of a gently rolling to rolling bedrock outcrop covered with alluvial deposits. The soils are Grey Wooded and Lithosol. They are medium-textured and well drained.

Soil Association: Belloy, Rahab, Teepee

Present use: Agriculture and woodland

Natural cover: Aspen and native grasses

Agro-climatic zone: 2 Ch

Ratings:

Agriculture	4 F T (5 F T)
Forestry	4 M
Ungulates	3 M T
Recreation	6 W O P
Waterfowl	6 T

Land System IIIc

Physiography: This land system consists of undulating to gently rolling complex topography. The soils are Dark Grey Wooded and Grey Wooded, medium-textured and well drained. The system may contain up to 20% poorly drained depressional areas.

Soil Association: Leith, Tangent, Davis

Present use: Agriculture

Natural cover: Aspen, native grasses on areas not cleared

Agro-climatic zone: 2 Ch

Ratings:

Agriculture	3 S
Forestry	4 M
Ungulates	3 T F
Recreation	6 W O P
Waterfowl	4 T G (3 T G)

Land System IIId

Physiography: This land system is the same as Land System IIIc; however, the topography is rolling complex.

Ratings:

Agriculture	4 T S
Forestry	4 M
Ungulates	1-2 T
Recreation	6 W O P
Waterfowl	5 T G

Land System IIIf

Physiography: This land system consists of rolling to gently rolling complex topography with many depressions with standing water. The soils are Orthic Grey Wooded, medium to coarse textured, well drained and very vulnerable to wind erosion.

Soil Association: Culp, Davis

Present use: Woodland, agriculture

Natural cover: Aspen, shrubs, native grasses, some black spruce

Agro-climatic zone: 2 Ch

Ratings:

Agriculture	5 T S
Forestry	5 M

Ungulates	2 F
Recreation	6 O E P
Waterfowl	3 T M

Land System IIIf

Physiography: This land system is characterized by gently rolling and rolling sand dunes. The soils are Brunisolic and Orthic Grey-Wooded, coarse-textured and rapidly drained. The system may have up to 20% organic soils.

Soil Association: Heart

Present Use: Woodland

Natural cover: Pine, aspen, white spruce with black spruce in depressional areas. Native grasses and shrubs.

Agro-climatic zone: 2 Ch

Ratings:

Agriculture	6 S
Forestry	6 M F
Ungulates	5 M F
Recreation	5 O E
Waterfowl	5 T M, 3 T M

Land System IIIg

Physiography: This land system is situated at the base of the north-facing Birch Hills escarpment. The topography is level to undulating with Gleyed Black medium- to fine-textured soils. They are imperfectly to poorly drained and under the influence of spring run-off and seepage.

Present use: Agriculture

Natural cover: White spruce, willow, grasses

Agro-climatic zone: 2 Ch

Ratings:

Agriculture	3 W
Forestry	4 W
Ungulates	2 M T
Recreation	6 W O P
Waterfowl	6 T

Land District IV

This land district consists of the erosion slopes of rivers and creeks with associated alluvial terraces.

Land System IVa

Physiography: Undifferentiated erosion slopes of rivers

Present use: Woodland

Natural cover: Aspen, white spruce, shrubs and native grasses

Agro-climatic zone: 2 Ch

Ratings:

Agriculture	7 T
Forestry	5 M U
Ungulates	1 W
Recreation	5 K Q O
Waterfowl	6 T

Land System IVb

Physiography: Undifferentiated erosion slopes of creeks

Present use: Woodland and grazing

Natural cover: Aspen, white spruce, shrubs and grasses

Agro-climatic zone: 2 Ch

Ratings:

Agriculture	7 T
Forestry	5 M U
Ungulates	2 W
Recreation	5 K Q O
Waterfowl	6 T

Land System IVc

Physiography: Lower terraces of Smoky River. This land system consists of level to undulating, medium- to fine-textured, well drained soils.

Soil Association: Alluvium

Present use: Agriculture, woodland

Natural cover: White spruce, aspen, shrubs and grasses

Agro-climatic zone: 2 Ch

Ratings:

Agriculture	3 S
Forestry	3
Ungulates	1 W
Recreation	4 K Y O P L
Waterfowl	6 T B

Land District V: Organic Materials

This land district consists of organic materials: brown to very dark brown coarse to fibrous peats made up of sphagnum mosses, sedges and leaves.

Land System Va

Physiography: Organic accumulations of sphagnum moss and fibrous peat in depressional areas.

Soil Association: Kenzie, Eaglesham

Present use: Woodland

Natural cover: Black spruce, occasional shrubs and labrador tea ground cover

Agro-climatic zone: 2 Ch



Picture 5. Land System IIa. Featureless lacustrine plain.



Picture 6. Land System IIIa.



Picture 7. Land System IIIc.



Picture 8. Drainage Ditch in Land System IIIc. Township 77, Range 25.



Picture 9. Land System IIIe.



Picture 10. Stratified fine sand and silt in hump of Land System IIIe.



Picture 11. Land System IVa. Minor gravel terrace (upper terrace) at Watino, west bank of Smoky River valley.



Picture 12. Land System IVb. Tributary to Burnt River in 35-78-3-W6. This valley is presently under grazing lease.

<i>Ratings:</i>	
Agriculture	7 W, 6 W
Forestry	7 W
Ungulates	6 M N
Recreation	6 O E W
Waterfowl	5 T F

Land System Vb

Physiography: Organic accumulations of sphagnum moss and fibrous peat in depressional areas. This system has 30% mineral soils, mainly humps (knolls) that rise above the muskeg.

Soil Association: Kenzie, Eaglesham, Prestville, Judah

Present use: Woodland

Natural cover: Black spruce, aspen, willow

Agro-climatic zone: 2 Ch

<i>Ratings:</i>	
Agriculture	6 W, 5 W
Forestry	7 W
Ungulates	6 M N
Recreation	6 W O P
Waterfowl	5 T G (1-4)

Land District VI

This land district is characterized by lacustrine plains that have a distinctive humpy surface expression. The humps are circular. They are associated with major rivers and usually occur in the lower portions of glacial laking basins. The topography in a given area is uniform, i.e. low and high knolls do not occur side by side.

Land System VIa

Physiography: This land system has undulating to gently rolling complex topography. The soils are Dark Grey Wooded and have a silty clay loam to silty clay texture. They are moderately well drained.

Soil Association: Judah (Davis)

Present use: Agriculture

Natural cover: Mixed woodland, mainly aspen

Agro-climatic zone: 2 Ch

<i>Ratings:</i>	
Agriculture	3 T
Forestry	4 X
Ungulates	2 T
Recreation	6 W O P
Waterfowl	5 T G

Land System VIb

Physiography: This land system is similar to Land System VIa; however, the topography is rolling complex.

<i>Ratings:</i>	
Agriculture	5 T S
Forestry	4 X
Ungulates	1
Recreation	6 W O P
Waterfowl	5 T G

Land System VIc

Physiography: This land system has undulating to depressional complex topography. Fine-textured and gleysolic soils form an integral part of the system. Organic soils occupy less than 20% of the total area.

Soil Association: Wanham, Nampa, Judah

Present use: Agriculture

Natural cover: Poplar, willow, black spruce

Agro-climatic zone: 2 Ch

<i>Ratings:</i>	
Agriculture	3 W
Forestry	4 W
Ungulates	4 M F
Recreation	6 W O P
Waterfowl	6 T

Land Capabilities

All disciplines supplying information to the Canada Land Inventory have divided the range of capabilities for production of renewable resources into seven classes, of which Class 1 is highest and Class 7 is lowest.

The Present Land Use map is not a capability map and consequently the 1 to 7 number system is not used.

Agriculture (Map 4)

The Canada Land Inventory for agriculture has placed the study area in the 2H climatic zone. This zone is described as an area where the amount of precipitation has usually been adequate but where wheat has suffered some frost damage in approximately 30% of the years. The frost-free period has averaged between 75 and 90 days. The highest soil capability class in such areas is a two. The classification has seven classes and class 2 to 7 are found in the study area. The level to undulating lacustrine plains are generally classed as number 2 agricultural soils

TABLE 2

SUMMARY OF LAND SYSTEMS

Land System	Description	Drained	Slope %	Soil	Agr	Use Potential For	Rec	W
LAND DISTRICT I: FINE-TEXTURED TILL, DERIVED FROM WAPITI AND SMOKY RIVER FORMATIONS - LOAM AND CLAY LOAM, OCCASIONAL STONE								
Ia	Undulating and gently rolling loam and clay loam till.	Moderately well	0-9	Orthic Grey Wooded	3	4	3	5 6
Ib	Gently rolling loam and clay loam till with up to 40% of sandy alluvial overlay.	Moderately well	5-9	Orthic Grey Wooded Codesa	3	4	3	6 6
Ic	Same as Land System Ia but with slopes of 10-30%.	Moderate to rapid	10-30	Orthic Grey Wooded Rahab	5	4	2	5 6
LAND DISTRICT II: FINE-TEXTURED, SOMEWHAT SALINE, LACUSTRINE DEPOSITS (OCCURS AT ELEVATIONS BELOW 2200 Ft. A.S.L.)								
Ila	Level to gently undulating clay loam and clay.	Imperfectly	0-2	Black Solod	2	4(5)	2-3	6 5-6
LAND DISTRICT III: WATER-AND WIND-SORTED, OFTEN STRATIFIED MATERIAL (SILT-SAND-GRAVEL)								
IIIa	Undulating and gently rolling medium-textured soils.	Well to imperfectly, depending on substrata	0-9	Chernozemic, Orthic Black, eluviated	3	4	2-3	6 6
IIIb	Same as Land System IIIa, with up to 40% residual material.	Well	5-15	Black, Grey Wooded and Lithosol	4(5)	4	3	6 6
IIIc	Undulating and gently rolling medium-textured soils.	Well	0-9	Orthic Dark Grey Wooded	3	4	3	6 4(3)
IIId	Rolling complex topography, medium-textured soils.	Well	9-15	Orthic Dark Grey Wooded	4	4	1-2	6 5
IIIe	Rolling and gently rolling complex topography with up to 30% poorly drained low areas.	Well	5-15	Wooded Pozolic, Grey Wooded	5	5	2	6 3
IIIff	Gently rolling and rolling dune sand.	Rapidly	5-15	Brunisolic, Grey wooded	6	6	5	5 5-3
IIIg	Level to undulating, imperfectly	Poorly	0-2	Gleyed black	3	4	2	6 6
LAND DISTRICT IV: UNDIFFERENTIATED EROSION SLOPES OF CREEKS AND RIVERS WITH ASSOCIATED ALLUVIAL TERRACES								
IVa	Erosion slopes of rivers	...	...	...	7	5	1	5 6
IVb	Erosion of slopes of creeks	...	...	...	7	5	2	5 6
IVc	Alluvial terraces	Well	0-5	Regosol Alluvium	3	3	1	4 6

TABLE 2 (cont'd.)

Land System	Description	Drained	Slope %	Soil	Use Potential Rates				
					Agr	For	Ung	Rec	W
LAND DISTRICT V: ORGANIC MATERIALS – RAW AND SEMI-DECOMPOSED SEDGES AND GRASSES OR MOSSES									
Va	Level to depressional fibrous peat and sphagnum moss.	Poorly	0	Organic and Gleysolic	6-7	7	6	6	5
Vb	Level to depressional with up to 30% mineral soils.	Poorly	0		6-5	7	6	6	5 (1-4)
LAND DISTRICT VI: FINE- TO MEDIUM-TEXTURED, USUALLY HUMPY, LACUSTRINE MATERIAL, ASSOCIATED WITH MAJOR RIVERS									
VIa	Undulating and gently rolling complex topography. Silty clay loam to silty clay.	Moderately well	0-9	Dark Grey Wooded	3	4	2	6	5
VIb	Same as Land System VIa, but with rolling complex topography.	...	0-15	...	5	4	1	6	5
VIc	Undulating to depressional silt loam to silty clay, in association with fine textured soils.	Imperfectly	Level	Gleysolic, Low Humic Eluviated Gleysol	3	4	4	6	6

(Picture 5). Humpy topography, typical for large areas of the Peace River Block (Picture 9) will give class 3 and 4 lands. Classes 5, 6 and 7 are found in poorly drained areas, steep slopes and riverbreak areas.

Forestry (Map 5)

In Section II of this report, the forest region is described as being Boreal Forest, Aspen-Grove Section (Rowe). This forest region classification is printed in a scale of 1:6,336,000 or 100 miles to 1 inch. At this scale the Birch Hills disappear. They may be classified as being part of the Boreal Forest and belonging to the Lower Foothills Section. This section is a transition between Boreal and Subalpine forest and consists of preglacial piedmont plains (erosion remnants).

These elevated plains usually receive more precipitation and have cooler temperatures than the surrounding lowlands. The soils have a tendency to be severely leached. The soils of the Birch Hills, which developed on fine textured till, are leached and classed Grey Wooded. The C.L.I. Land Capability for Forestry shows a 4 rating for most of the area. A small area of solonchic lacustrine soils in the western part of the area and the sandy and silty soils in the east have a 5 rating. The alluvial flats in the valley of the Smoky River are classed as 3 capability.

The alluvial soils found on the lower slopes and at the base of the hills may well be capable of producing a higher yield than C.L.I. class 4. Lateral movement of water, as present in these areas, has proven to yield above-average growth in forest species.¹

Ungulates (Map 6)

The C.L.I. ungulate classification has three additional classes, making a total of ten. These extra classes are 1W, 2W and 3W, indicating winter range on which animals from surrounding areas depend. On the Alberta plains these winter ranges are usually found within the confines of major valleys.

The degree of land development is impor-

tant in evaluating ungulate capability ratings. These ratings are based on the optimum vegetational stage of virgin lands and do not reflect present land use.

It stands to reason that ungulate ratings in agricultural areas which are developed for over 50% of their capacity have lost their value.

Recreation (Map 7)

The outdoor recreation potential of the area is rated as low. The Birch Hills are not suitable for skiing development and have a 5 rating.¹

Kakut Lake, which is the only named lake in the area, is badly infested with algae and has no beaches suitable for recreational development.

The valley of the Smoky is dominantly 4 capability, which is the highest for the study area. The K and Y subclasses indicate camping and boating capability.

Waterfowl (Map 8)

The C.L.I. land capability for waterfowl has introduced 4 additional classes, bringing the total to 11. These extra classes, 1S, 2S and 3S, indicate important staging areas on migration routes while 3M indicates wintering areas.

The study area contains classes 1 to 6. Humpy topography, with perched water tables as found in the eastern part of the area, has created excellent waterfowl environment.

Kakut Lake in Township 77-4-W6 has marshy edges and is rated 2.

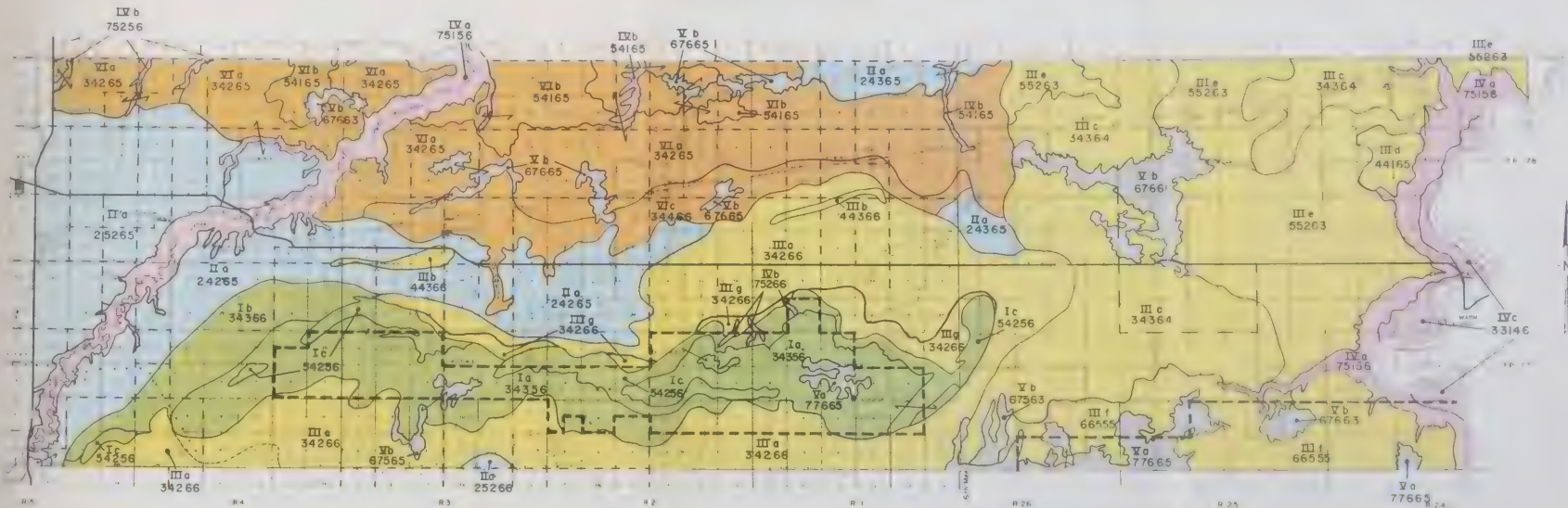
It was observed that areas of Class 1 waterfowl in Township 77 and 78, Range 25 are drained by ditches constructed by the Water Resources Division of the Department of Agriculture. The local population requested this drainage in order to alleviate spring flooding in low areas.

Ducks Unlimited has placed a weir in the creek which drains Kakut Lake.

1. H. Knight and P. J. B. Duffy, "A Forest Land Capability Classification for the Marsh Head Demonstration Area, Whitecourt Forest: Project A. 92." Information report A-X-10, Department of Forestry and Rural Development, May 1967

1. In March 1971 a recreational lease was issued to the Birch Hills Ski Club in LSD 14, 23-77-2-W6. At present clearing for a tow-line and run have been completed.

BIRCH HILLS



LAND DISTRICT MAP

Land District I - Fine Textured Till - derived from Wapiti and Smoky River formations - loam and clay loam, occasional stone

Land District II - Fine Textured, somewhat saline, lacustrine deposits (occurs at elevations below 2200 ft A.S.L.)

Land District III - Water and wind sorted, often stratified material (Silt; Sand - Gravel)

Land District IV - Erosion slopes of rivers and creeks with associated alluvial flats

Land District V - Organic materials - raw and semi-decomposed sedges and grasses or mosses.

Land District VI - Fine to medium textured, usually humpy, lacustrine deposits, associated with major rivers

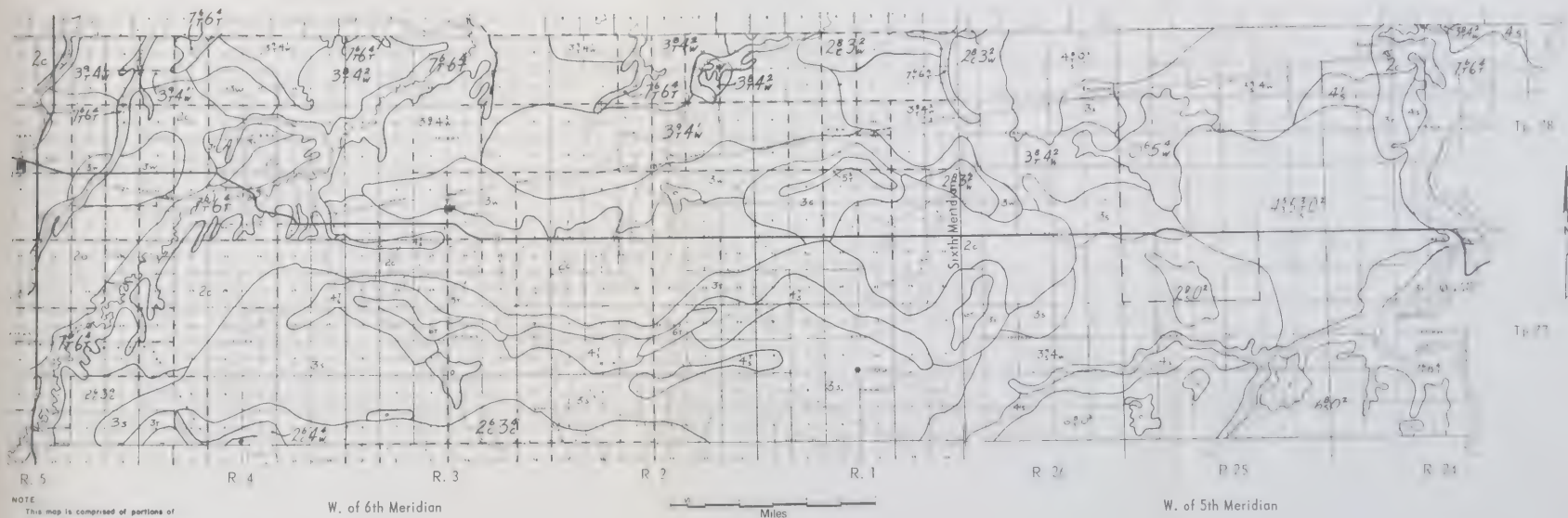
--- Present Green Zone Boundary

USE - POTENTIAL RATES EXPRESSED IN THE FOLLOWING SEQUENCE:

1st No	2nd No	3rd No.	4th No	5th No
AGRICULTURE	FORESTRY	UNGULATES	RECREATION	WATERFOWL

		map prepared by Land Use Assignment Section Technical Division
Prepared by [Signature]	Preliminary [Signature]	Final [Signature]

BIRCH HILLS

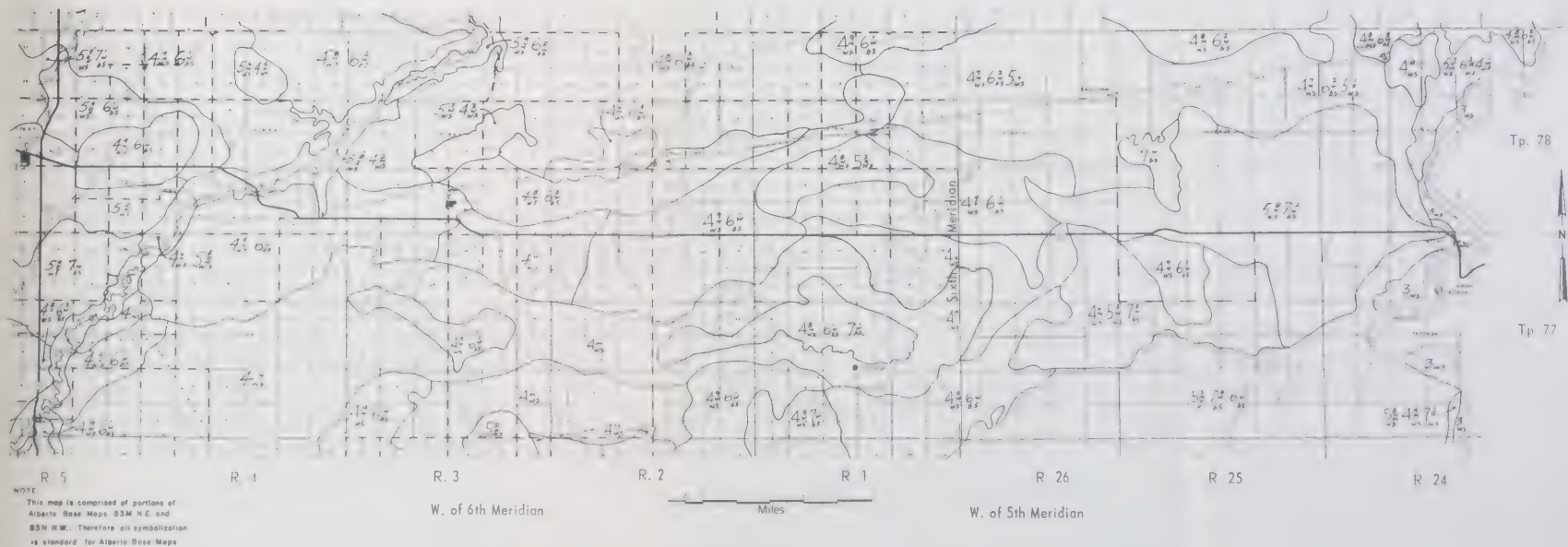


NOTE

This map is comprised of portions of
Alberta Base Maps: BSM N.E. and
BSM W.W.. Therefore all symbolization
is standard for Alberta Base Maps

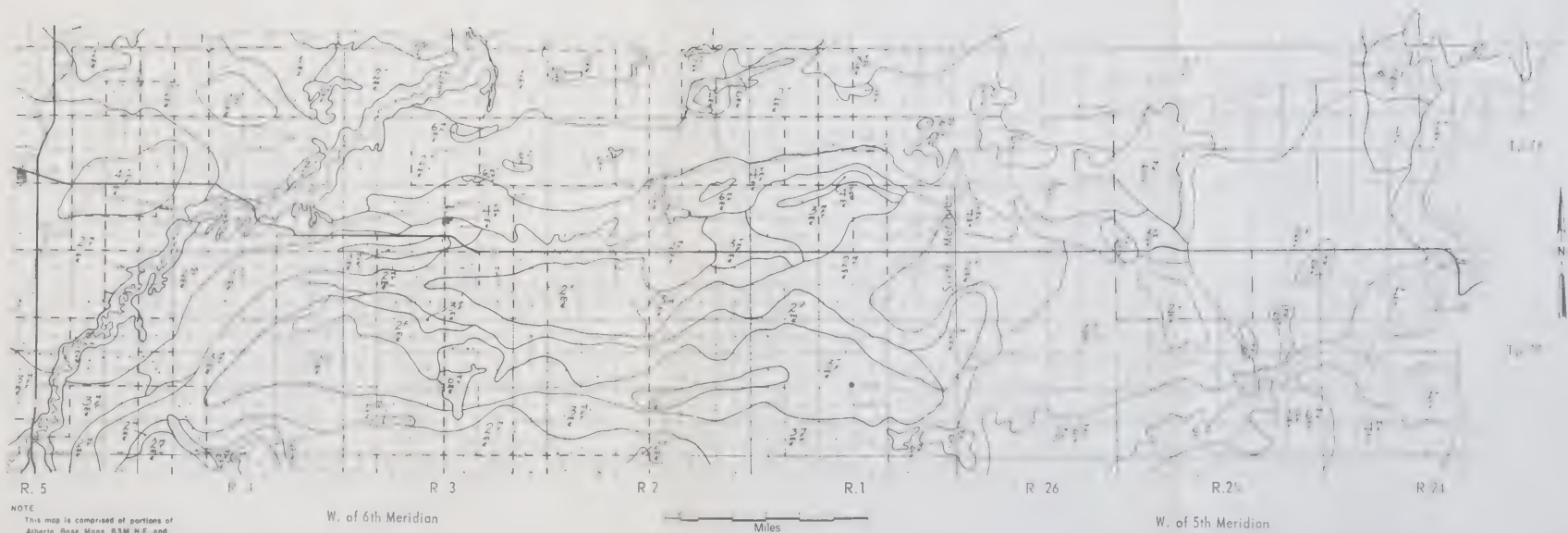
CANADA LAND INVENTORY - LAND CAPABILITY FOR AGRICULTURE

BIRCH HILLS



CANADA LAND INVENTORY- LAND CAPABILITY FOR FORESTRY

BIRCH HILLS

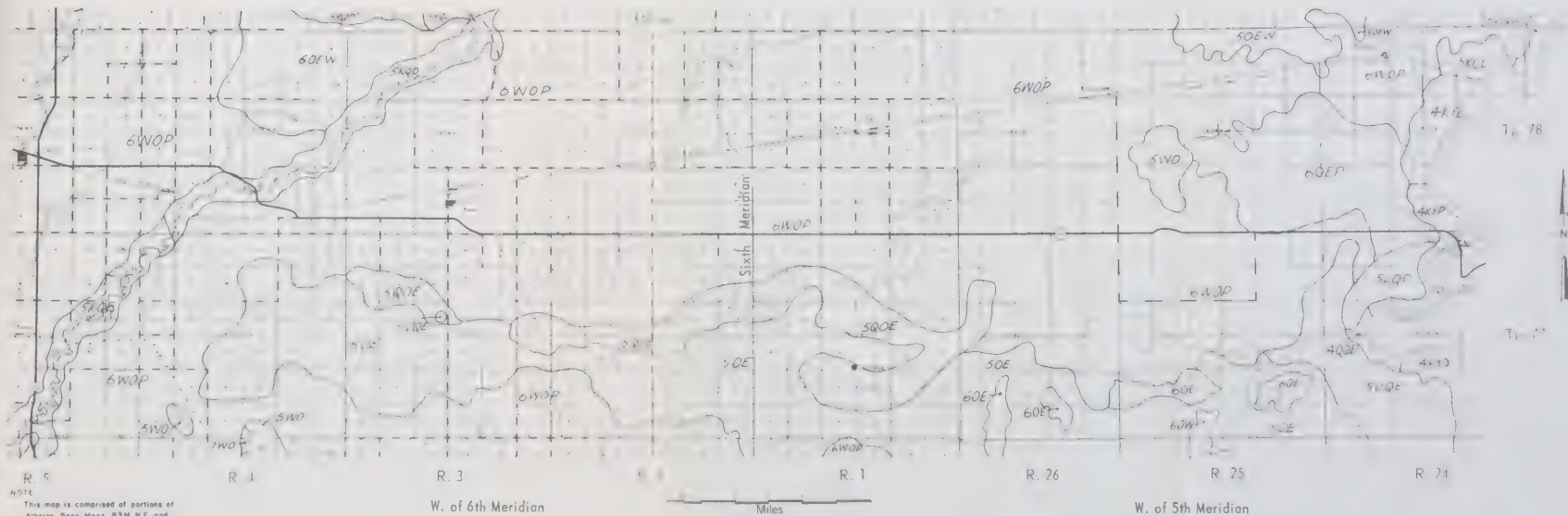


NOTE

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Alberta Base Maps 8334 W.E. and
8335 W.E. Therefore all symbolization
is standard for Alberta Base Maps

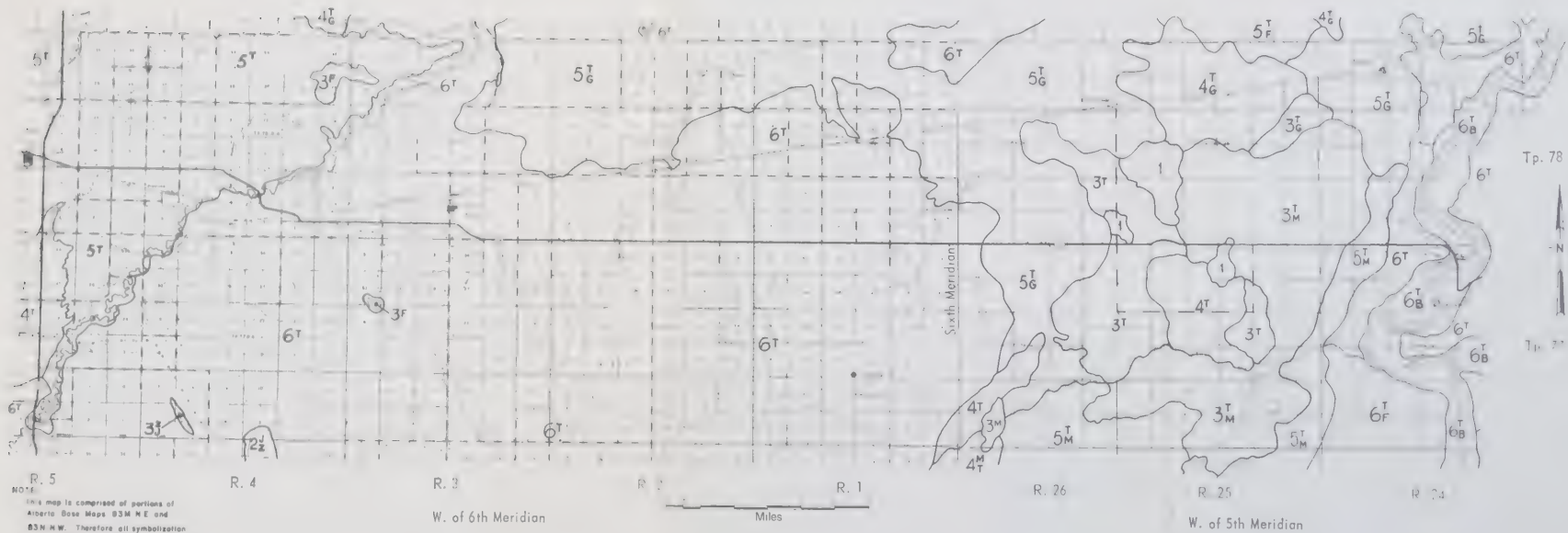
CANADA LAND INVENTORY - LAND CAPABILITY FOR UNGULATES

BIRCH HILLS



CANADA LAND INVENTORY - LAND CAPABILITY FOR RECREATION

BIRCH HILLS



CANADA LAND INVENTORY - LAND CAPABILITY FOR WATERFOWL

BIRCH HILLS



CANADA LAND INVENTORY — PRESENT LAND USE
(1961 Aerial Photography)

Improved Land

BIRCH HILLS



R.5

R.4

R.3

R.2

R.1

R.26

R.25

R.24

W. of 6th Meridian

W. of 5th Meridian

Scale: Approx. 1" = 2 3/5 Miles

MILES 1 2 3 4 5 MILES

Alberta

LANDS AND FORESTS
Land Use Assignment Committee

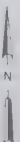
map prepared by
Land Use Assignment Section
Technical Division

— Present Green Zone Boundary
Compiled from 1970 Aerial photographs

Prepared by
C. Van Waas

Preliminary

Final





Picture 13. Land System IVc. Cultivated river flats of the Smoky River at Watino.



Picture 14. Land System Va. Birch Hills plateau-Wanham Road



Picture 15. Land System VIb. Humpy lacustrine plain.



Picture 16. Beef cattle operation on Land System IIIc.

HISTORICAL DEVELOPMENT

Land records show that settlement in the study are started as early as 1910. The prairies in the Spirit River-Rycroft area attracted the settlers and the search for additional prairie land reached the Wanham district in 1914. The settlers most likely travelled the Edson trail and took out land at the Land Office in Grande Prairie, which was opened in 1911. The Land Office in Grouard opened in 1909 or 1910 and several settlers may have entered the area via the Lesser Slave Lake route and the Peace River Trail. The Peace River Crossing land office (present town of Peace River) opened in 1916. The census of 1911 credited the entire Peace River region with less than 2000 inhabitants, including the native population. Steady expansion took place after this date. The extension of the railroad into Spirit River in 1915-16 heralded the beginning of major agricultural development in the study area. (The railroad crosses the area from east to west.) The choice prairie lands were taken out by the pre-railroad settlers and later development took place in the parkland and wooded areas.

The latest wholesale agricultural development in the area took place after the Second World War. The Alberta Land Clearing Project was initiated by the Provincial Government, in order to provide land to war veterans. Map 11 shows land development in the area as recorded by the Alberta Soil Survey in the 1950 report of the Rycroft and Watino Sheets.

GENERAL DESCRIPTION

The Birch Hills study area covers part of I.D. 132 (19) and M.D. 133. Statistics Canada provides information on improvement and municipal districts. As a result much informa-

tion is available as to the social and economic make-up of the area. The boundaries of the study area in relation to I.D. and M.D. are given in map 11.

Population

Before the outbreak of the First World War the settlers arriving in the Peace River district came from all over the globe. The war suspended all immigration except from the United States. Many French-speaking Canadians settled in the area, especially around Fahler and into the eastern part of the study area. Post-war years saw an influx of veterans taking advantage of government land offers.

The southern part of the Peace River country, which includes the study area, was favoured in 1926 and 1927 with two exceptional bumper crops, which were followed by two years of very good harvests. These four years of bounty established the Peace River as a grain-growing area and as a result the number of farms more than doubled between 1926 and 1931.

A lack of transportation facilities for farm products and the depression years of the nineteen-thirties saw a decline in population. The trend towards larger farming units and replacement of labour by modern farm machinery resulted in a continuation of the decline in the rural population. An increase in numbers was experienced as a result of the Alberta Land Clearing Project; consolidation of these farms has brought the population decline trend in line with the Peace River country as a whole.

The number of farms and the farm population for the period 1951-1966 is given in Table 3.

TABLE 3
NUMBER OF FARMS AND FARM POPULATION BY SUBDIVISION

	1951		1956		1961		1966	
	No. Farms	Farm Pop.	No. Farms	Farm Pop.	No. Farms	Farm Pop.	No. Farms	Farm Pop.
I.D. 132	690	2,462	731	2,462	665	2,010	601	2,106
M.D. 133	383	1,284	375	1,296	317	1,081	292	1,040

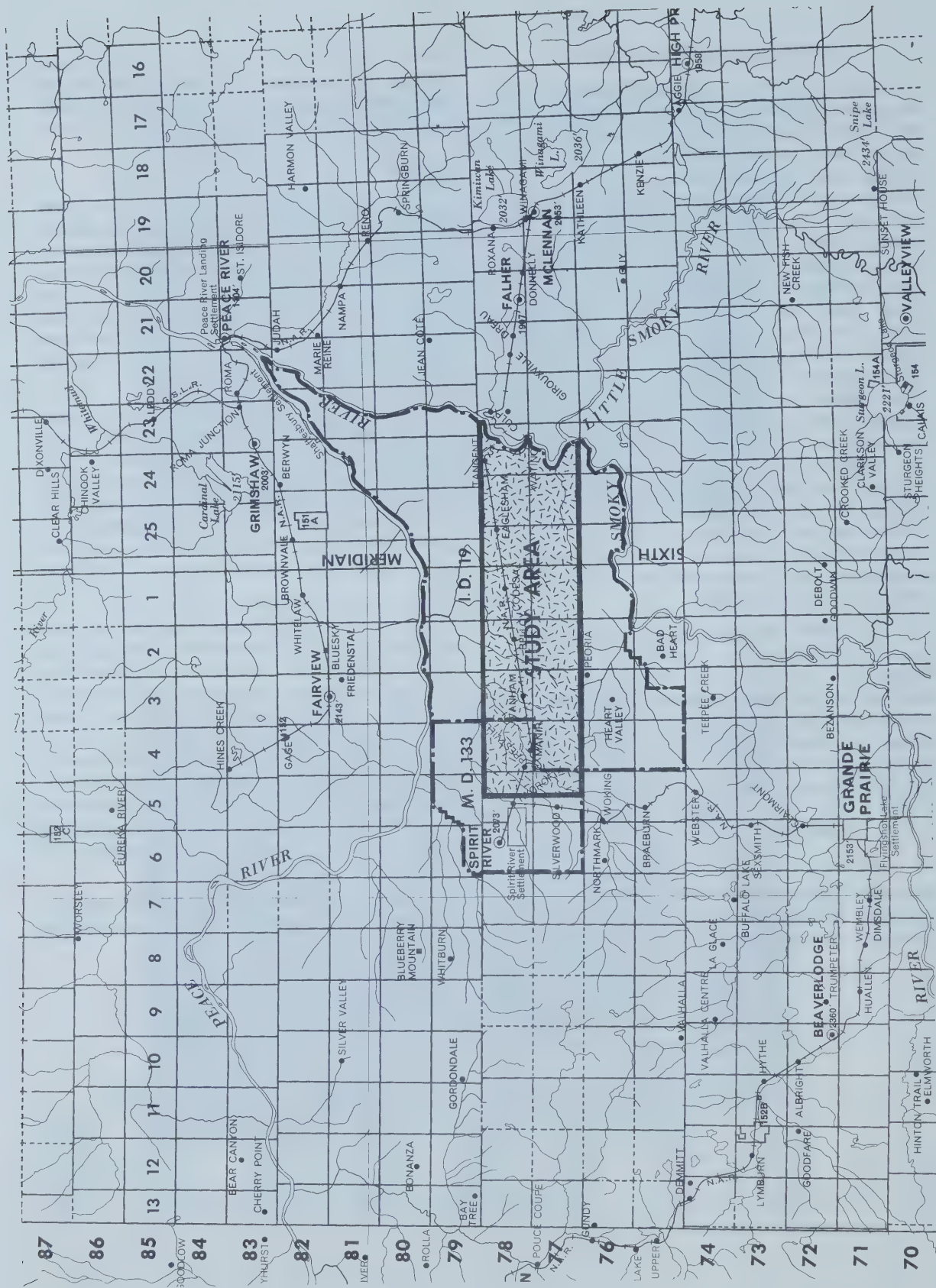


TABLE 4
FARMS GROUPED ACCORDING TO SALES AND BY SUBDIVISION

	Small Farms with sales under \$2,500		Commercial Farms							
			Sales of \$2,500 \$3,749	Sales of \$3,750 \$4,999	Sales of \$5,000 \$9,999	Sales of \$10,000 \$14,999	Sales of \$15,000 \$24,999	Sales of \$25,000 and over		
	1961	1966	1961	1966	1961	1966	1961	1966	1961	1966
I.D. 132	372	216	100	89	89	143	4	31	0	10
M.D. 133	167	93	56	37	42	83	10	14	1	4

TABLE 5
PART-TIME INCOME: WORK OFF THE FARM
HIRED LABOUR: PART-TIME OPERATORS
(1966)

	Part-time income		Off-farm Work				No. of hired farm workers		Year-Round workers	Part-time operators
	Less than \$750	More than \$750	12 days or less	13-72 days	73-228 days	229-365 days	Male	Female		
I.D. 132	433	168	12	69	114	27	114	6	13	180
M.D. 133	187	105	11	27	61	24	71	1	5	107

Income

Statistics Canada differentiates between two types of farms. The first group is called "census farms" and refers to an agricultural holding of one acre or more in size with sales of agricultural products during the twelve months preceeding the census date of \$50.00 or more. The second group is called "commercial farms" and these farms have an annual gross sale of \$2,500 or more. During the period 1961 to 1966 the number of commercial farms in Improvement District 132 increased from 293 to 387. The corresponding numbers for Municipal District 133 (Spirit River) are 150 and 199. From this information it is evident that there is a healthy growth towards farms with a gross annual income of more than \$2,500.

The major portion of the study area is situated in I.D. 132 and all Statistics Canada information therefore is pertinent to this area. Information for Municipal District 133 of Spirit River is included in the tables. The apparent trend towards a higher income, as mentioned before, is expressed in Table 4 where a decline in the number of census farms and an increase in income in the commercial farm group is recorded. This increase is progressive in the higher group, especially above \$5,000.

The statistics on off-farm labour are expressed in Table 5, where we find that out of a total farm number of 611, 433 made less than \$700.00 per year additional income while 168 operators went over this amount. Of this number only 27 were employed off the farm on a nearly year-round basis.

The average size of the census farm is 540 acres and the average size of the commercial farm in the district is 760 acres. The spread between the two categories gives an indication of size of farm in relation to income.

Farm consolidation was active during the period 1956-1966. A steady shift of farm holdings of less than a full section towards holdings of a section or larger was recorded. This growth in farm size was achieved by farm consolidation and expansion into virgin lands. See Table 6.

Transportation

The study area has an up-to-date transportation network. The railway is crossing the

TABLE 6
CHANGES IN FARM SIZE
1956-1966

I.D. 132 (Wanham)				Electric Power 1966
Farm Size	1956	1961	1966	
3 acres				
3-9	1		1	
10-69	1	2	2	
70-239	100	87	61	
240-399	332	241	154	
400-559	116	114	84	
560-759	94	101	125	
760-1119	55	75	100	
1120-1599	24	28	48	
1600-2239	6	11	17	
2240-2879	2	2	4	
2880		4	5	
TOTAL	731	665	601	433
M.D. 133 (Spirit River)				
3 acres			1	
3-9	1		2	
10-69	8	2	6	
70-239	84	60	37	
240-399	134	84	65	
400-559	73	66	56	
560-759	42	39	46	
760-1119	21	49	47	
1120-1599	10	11	21	
1600-2239		2	7	
2240-2879	1	2	2	
2880	1	2	2	
TOTAL	375	317	292	211

area from east to west and was built in 1915-16. It runs from the village of McLennan to Spirit River. Highway 49, which is blacktopped, connects Highway 2 east with Highway 2 west, and is one of the two major east-west roads in the south Peace River Country. Highway 34 from Valleyview to Grande Prairie is the main east-west highway. Three secondary roads cross the Birch Hills to connect the agricultural area north of the Birch Hills with the Peoria district. A network of secondary roads extends north of Highway 49. The town of Spirit River west of the study area and the town of Falher to the

east both own and operate an airstrip. The airstrips are licensed by the Department of Highways and Transport.

Education

The study area falls within the boundaries of the Spirit River School Division. The village of Eaglesham in the eastern part of the area has high school facilities and teaches grades 1 to 12. The village of Wanham, in the approximate centre of the area, also teaches grades 1 to 12 and the town of Spirit River, approximately 6 miles from the western boundary of the area, has a large composit high school which teaches grades 7 to 12. All schools serving the district, with grades taught and number of teaching staff, are as follows:

	School	Teachers	Grades
1	Wanham	13	1-12
2	Eaglesham	17	1-12
3	Tangent	3	1-8
4	Spirit River Sec.	24	7-12

Land Disposition

In the study area there are four groupings of land. The largest group is patented land, with 1525 quarters or 244,000 acres under patent. A total of 247 quarters or 38,520 acres are presently in the Green Area. There are 8 quarters in the former Brown Zone, and 35 quarters of unoccupied Crown land outside of the Green area.

The following is a table of dispositions of quarter-sections of Crown land, of which some may lead to title.

DISPOSITION OF CROWN LAND	
Homestead lease	26
Veteran Homestead lease	2
Homestead sale	79
Grazing lease	108
Grazing permit	3
Agricultural lease	2
Agricultural farm sale	1
Cultivation lease	12
Farm consolidation sale	3
Fish and Wildlife reservation	13

AGRICULTURE AND RELATED ACTIVITY

Farm Practices

Type of farming and to a measure the quality of the soil combined with level of technology, distance to market, available finances and government policies influence the monetary returns of farm holdings.

The soils in the study area fall in three categories, called soil orders. They are the chernozemic order or black soils which are found in the western part of the area; the podzolic order which is divided into Dark Grey Wooded soils and Grey Wooded soils; Dark Grey Wooded soils are found in the north central part of the area and the Grey Wooded soils are found to the east and on the Birch Hills proper. The gleisolic order, which represents soils with a drainage problem, are found in a narrow east-west band approximately parallel to the railroad. The various soil orders are represented on a soil zone map (Map 1).

Map No. 2 shows the topography in the study area. Gently rolling and hilly topography is mapped and it will be noticed that most of the multiple-slope topography is in the podzolic order. These soils are not only of lower quality as compared to the black soils but they have a choppy topography with associated wet areas.

Land development started with the black soils and after they were all taken out moved into the Dark Grey Wooded areas. Grey Wooded soils were the last to be brought under cultivation. In terms of acres cleared the same sequence occurs. Highest percentage of cleared land will be found on the black soils and the lowest percentage per farm unit on the Grey Wooded soils with choppy topography.

Tables 7 and 8 give the improved acres and land use in acres.

The growing season is sufficient for most field crops. Droughts, frosts and unpredictable harvest weather are the main drawbacks to agriculture in this area.

The land disposition map for the area shows that no virgin land is available for farm consolidation; however, Table 9 shows that 60,745 acres in I.D. 132 are rented. Farm

consolidation can move into this land category. Retiring farmers and people moving out of the district will make additional land available for consolidation.

The percentage of commercial farms versus census farms is 71 for Alberta. The 68% for I.D. 132 and 68% for M.D. 133 approach the Alberta average of 71%. Only I.D. 135 and 136 Grimshaw and Fairview surpass this percentage in the Peace River Country. For comparison, the County of Grande Prairie has a percentage of 66.

As for investment, Table 10 gives an average capital investment per farm of \$43,700. This total amount is broken down into \$29,600 for land and buildings and \$12,100 for machinery and equipment. The average livestock is valued at \$2,000 per farm. The Alberta average for capital per farm is \$60,700.

A variety of field crops is grown in the area. According to Table 11 wheat shows a small increase; however, in relation to increased acreage under cultivation there is an actual decline in wheat production. Rape seed has seen a spectacular increase in acreage during the period 1956-1966. The same can be said for barley. Oats have seen a steady decline and the hay and fodder crop shows a steady increase over this period. The bottom part of the table shows the value of crops sold. The last column shows money paid out in the district from the Prairie Farm Assistance Act and the number of farms involved.

Livestock production in the study area has undergone considerable change. While the number of dairy cows dropped steadily between 1951 and 1966, the total cattle numbers show an increase and dairying has undergone considerable adjustment. There has been a large drop in the number of farms reporting milk and cream sales and the number of milk cows per farm has increased from three in 1956 to 11 in 1966. Milk production per cow has increased an average of 64 percent over the same period. It is assumed that a viable dairy unit needs a minimum of 30 milking cows.

Hog and sheep production have shown a sharp decline in the period 1951-66. Table 12 shows livestock numbers for the period 1951-66. The value of livestock sold is expressed in the

bottom part of the table. A stock-buying station is located three miles south of Eaglesham in 7-70-25-W5.

The grain elevator capacity of the area is considerable. Stations and their capacity are given in Table 13.

The use of fertilizers in the district is shown on Map 14. This map shows tonnage sold and the assumed average application per acre. It will be noticed that I.D. 136 Fairview and I.D. 133 Spirit River show a high rate of use per acre. These areas are characterized by dominantly chernozemic soils. If this trend holds true for I.D. 132, it will raise the average for the chernozemic soils in the west part of the study area and lower the average on the Grey Wooded soils.

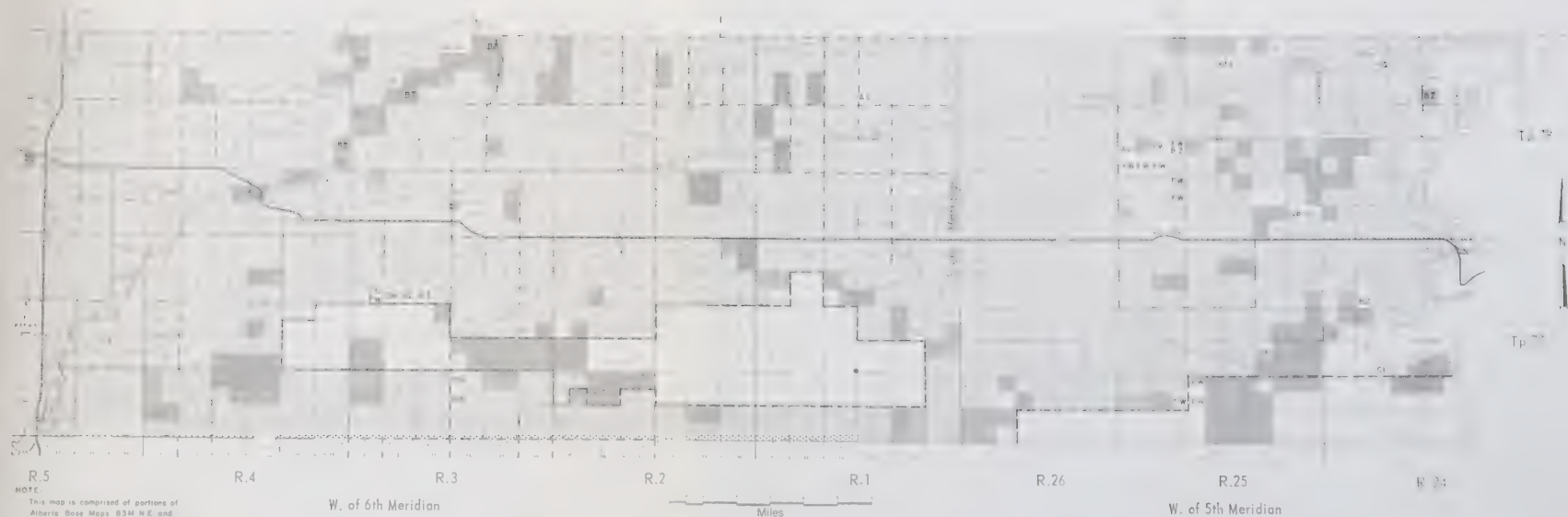
Soil Conservation

Erosion potential is a factor that warrants special consideration in parts of the study area. (See Pictures 17-20.)

The long even slopes on the south exposure of the Birch Hills will receive a maximum amount of heat units in spring with a resulting rapid snow melt. The volume of water released combined with the long slopes will result in gullying and sheet erosion. Proper farming practices may take care of this hazard. The steep north slope of the Birch Hills will give a slow snow melt in the spring resulting in seepage well into the growing season. Lands at the base of the hills will be affected by this seepage. Seeding practices will be hampered in the spring on these lands and they may be suited for the production of hay only.

The light textured soils in the southeast part of the study area are vulnerable to wind and water erosion. Their choppy topography, which may go up to a 10-12% slope for the small hillocks, impede drainage during the spring. The Water Resources Division of the Department of Agriculture has, on request of the farmers, constructed several drainage ditches in order to facilitate earlier seeding of the agricultural lands. Several farmers in this area who recently went into a cattle enterprise are complaining about the drop in ground water level due to this drainage. It appears to be difficult to keep water

BIRCH HILLS



LAND DISPOSITION

- | | | | |
|-----|-------------------------|-----|-------------------------------|
| | Potented Land | AL | Agricultural Lease |
| | Homestead Sale | CL | Cultivation Lease |
| | Homestead Lease | GP | Grazing Permit |
| | Grazing Lease | FW | Fish and Wildlife Reservation |
| AFS | Agricultural Farm Sale | BZ | Buffer Zone Reservation |
| VHL | Veteran Homestead Lease | --- | Present Green Zone Boundary |

Alberta

LAND AND FORESTS
Land Use Assignment Committee

map prepared by
Land Use Assignment Section
Technical Division

Prepared by: _____
Checked by: _____
Date: _____

TABLE 7
TOTAL AND IMPROVED ACREAGE
BY MUNICIPAL SUB-DIVISION

Location	Total Acreage (1)	Acreage in Farms (2)	Improved Acres 1966 (2)	% of Total Acreage Improved	% of Acreage in Farms Improved
I.D. 132 (Wanham)	728,206	409,808	257,179	35.3	63.0
M.D. 133 (Spirit River)	185,487	177,494	127,088	68.5	72.0

(1) Alberta Municipal Affairs; Annual Report, Edmonton 1966

(2) Statistics Canada

TABLE 8
LAND USE BY SUBDIVISION (ACRES)

	1951	Total Farms	1956	1961	1966	Change 1951-66
I.D. 132 (Wanham)						
Area in farms	256,600	690	332,685	367,374	409,808	
Improved	134,919		197,511	218,821	257,179	122,260 acres (90%)
under crop	94,671		137,386	164,693	206,178	
s. fallowed	22,679		50,170	39,286	41,874	
pasture	3,584		5,103	10,346	4,986	
Unimproved	120,681		135,174	148,553	152,629	
woodland	44,625		80,667	22,275	34,199	
M.D. 133 (Spirit River)						
Area in farms	146,970	383	156,905	168,062	177,494	
Improved	87,266		99,345	106,800	127,088	39,822 acres (46%)
under crop	64,340		68,147	75,935	90,647	
s. fallowed	18,017		26,112	25,532	30,844	
pasture	2,269		2,820	3,249	3,342	
Unimproved	59,954		57,560	61,262	50,406	
woodland	19,954		26,761	8,902	10,469	

TABLE 9
AREA AND NUMBER OF FARMS
BY SUBDIVISION

Subdivision	Total Area in Farms	Area Owned	Area Rented	Area Managed	Area in Commercial Farms	No. of Commercial Farms	No. of Census Farms	Commercial As % of Census Farms
132	409,808	313,131	60,745	35,932	294,156	387	601	64
133	177,494	140,839	35,055	1,600	148,383	199	292	68

TABLE 10
FARM CAPITAL BY SUBDIVISION

Subdivision	No. of Farms	Total Farm Capital	Capital Per Farm	Land & Buildings	Value Per Farm	Machines & Equipment	Value Per Farm	Livestock & Poultry	Value Per Farm
132	601	26,260,300	43,700	17,784,100	29,600	7,265,300	12,100	1,210,900	2,000
133	292	14,918,100	51,000	10,388,800	35,600	3,795,900	13,000	733,400	2,500

TABLE 11
CROP PRODUCTION BY SUBDIVISION (acres)

Subdivision	1951		1956		1961		1966	
BARLEY								
132	11,321		37,011		34,723		60,047	
133	9,146		29,575		26,911		36,761	
WHEAT								
132	39,434		40,159		36,305		42,883	
133	28,409		15,314		13,709		26,537	
OATS								
132	20,490		16,617		12,015		5,693	
133	15,814		10,002		7,548		4,357	
TAME HAY AND FODDER								
132	23,380		22,672		40,007		43,159	
133	9,745		9,665		19,342		13,297	
OIL SEED								
	FLAX	RAPE	FLAX	RAPE	FLAX	RAPE	FLAX	RAPE
132	8,617	—	19,864	—	9,287	27,885	11,685	39,272
133	727	—	3,220	—	1,321	6,175	1,110	7,900

TABLE 11A VALUE OF CROPS SOLD BY SUBDIVISION

Wheat			Other Grains		Hay and Fodder		Potatoes & Veg.	Other PFAA etc.	
	Value	No. of Farms	Value	No. of Farms	Value	No. of Farms	Value	Value	No. of Farms
132	535,570	337	1,773,280	525	429,340	167	4,331	114,940	311
133	427,150	202	772,720	251	108,400	58	—	20,850	60

TABLE 12

NUMBERS OF LIVESTOCK

Municipality	1951	% Increase 1951-56	1956	% Increase 1956-61	1961	% Increase 1961-66	1966	% Increase 1951-66	Per Farm (1)
132	2,937	70	5,000	32	6,587	17	7,726	163	37
133	2,214	57	3,468	30	4,518	2	4,624	109	32

NUMBER OF COWS BY SUBDIVISION

Municipality	1951	1956	1961	1966	Per Farm
132	1,155	971	945	524	9
133	825	786	564	425	8

SWINE NUMBERS BY SUBDIVISION

Municipality	1951	1956	1961	1966	Per Farm
132	2,888	5,387	6,741	2,486	24
133	1,571	1,960	2,710	1,632	20

SHEEP NUMBERS BY SUBDIVISION

Municipality	1951	1956	1961	1966	Per Farm
132	271	728	1,513	489	82
133	168	168	221	85	28

VALUE OF LIVESTOCK SOLD BY SUBDIVISION
1966

Municipality	Cattle & Calves		Pigs		Sheep & Lambs		Hens & Chickens	
	Value	No. Farms	Value	No. Farms	Value	No. Farms	Value	No. Farms
132	362,090	208	112,600	103	4,910	6	X	4
133	276,520	146	65,620	83	1,080	3	X	3

(1) Average number of livestock per farm reporting sales in 1966. Statistics Canada.

TABLE 13
GRAIN ELEVATORS IN STUDY AREA

Station	Manager	Capacity
Watino	* Federal Grain Limited	25,000
Tangent	* Alberta Wheat Pool	100,000
Eaglesham	* Alberta Wheat Pool	83,000
	United Grain Growers Ltd.	112,000
Codesa	* United Grain Growers Ltd.	92,000
Belloy	* United Grain Growers Ltd.	83,000
Wanham	* Alberta Wheat Pool	116,000
	United Grain Growers Ltd. 1	143,000
	United Grain Growers Ltd. 2	108,000
Rycroft	Alberta Wheat Pool	157,500
	National Grain (1968) Ltd.	147,500
	* United Grain Growers Ltd.	156,000
Spirit River	Alberta Wheat Pool 1	122,000
	* Alberta Wheat Pool 2	162,000
	Federal Grain Limited	101,000
	National Grain (1968) Ltd.	124,000
	United Grain Growers Ltd. 1	135,000
	United Grain Growers Ltd. 2	147,000

*Key agent

All elevators are Public Country Elevators on the Northern Alberta Railway

in the dugouts.¹

The light-textured soils are ideally suited for cattle enterprises. The sod will cut down water and wind erosion and spring runoff collecting in the low spots will not be detrimental to this type of farming.

FORESTRY RESOURCES AND RELATED ACTIVITY

A major proportion of the Birch Hills is zoned Green. This area is not incorporated in a management unit. The Codesa Lookout Tower in the north-east of 9-77-1-W6, which is maintained by the Alberta Forest Service, keeps a watchful eye on what is left of the timber resources. Devastating fires in the past have

destroyed the timber and some small clumps of spruce trees are all that remain of the softwood species. The dominant vegetation of the Birch Hills is aspen and some black spruce are found in the poorly drained areas. Part of the Birch Hills, especially the western part, is utilized for grazing.

The only other Green Area is in the south-east part and occupies parts of Township 77, Range 24, 25 and 26. This area is incorporated in the provisional reserve area of Procter and Gamble. Several grazing leases are located in this area, for instance the Four Mile Creek Grazing Association in Township 77, Range 25. The members of the grazing association are farming marginal land to the north of here.

1. Excerpt from the minutes of the October 8th, 1971 meeting of the Improvement District No. 19 Agricultural Service Board:
"The members actively discussed the Green Areas in I.D. 19 remaining as such. It was brought to the attention of the meeting some land had been broken in the Birch Hills area and is now growing back to brush. The meeting recommends that this land be withdrawn from settlement."
"Mr. Lambricht moved that the Birch Hills and all existing Green Areas in I.D. 19 be excluded from settlement and remain in Green area. Carried."
"The meeting requested that protection of the Green Areas in I.D. 19 be brought to the attention of the Spirit River East Farm Adjustment Committee."

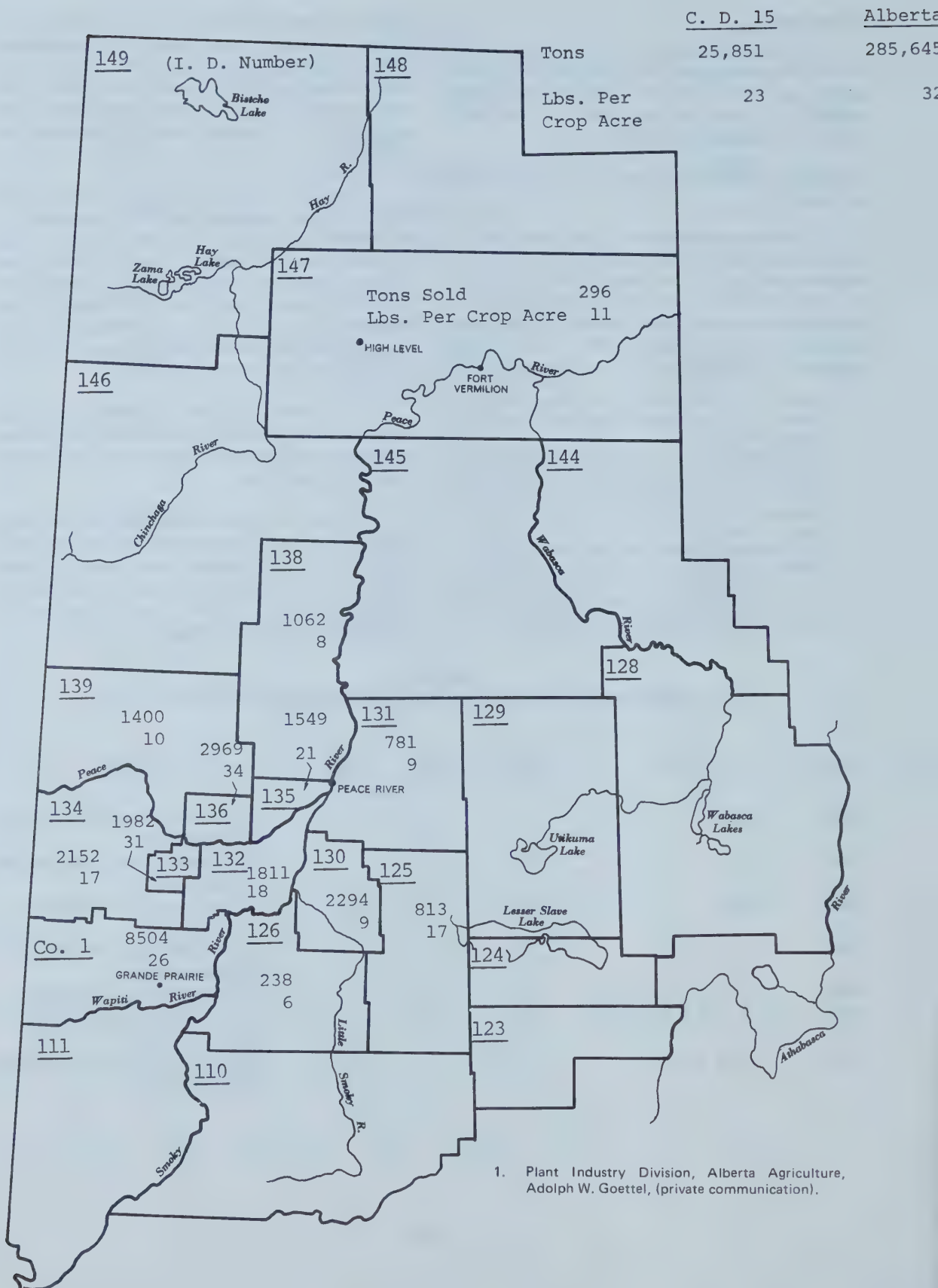
No records of tree harvesting could be traced for the Green Area in this district. Mature timber of commercial species is not available in economic quantities.

A lack of spruce seed trees in the Birch Hills has led the Alberta Forest Service into a program of scarification and seeding. Partial failure of the seed to germinate resulted in planting activity. Years and quantities of seedlings planted are in Table 14.

TABLE 14
TREE-PLANTING OPERATIONS IN THE BIRCH HILLS

<u>Year</u>	<u>Section</u>	<u>Twp.</u>	<u>Rge.</u>	<u>Mer.</u>	<u>Details</u>
1962	10, 11	77	1	6	60 acres conventional planting 30,000 seedlings
1963	11, 14	77	2	6	48.5 acres conventional planting 24,350 seedlings
1964	SE18	77	2	6	4 acres conventional planting 2,290 seedlings
1965	L.S. 1 of 16	77	2	6	3 acres container planting 1,482 seedlings
1965	10, 11, 12, 15, 16	77	2	6	482 acres scarified & seeded
1966	L.S. 8, 9 & 10 of 16	77	2	6	13 acres container planting 6,759 seedlings
1970	10, 15, 16, 17	77	2	6	389 acres conventional planting 100,000 seedlings

TONS OF FERTILIZER SOLD - 1966^{1/}



PROBLEMS ASSOCIATED WITH THE AREA

The Birch Hills study area is a well-established agricultural district. Row cropping is dominant in the western part. Fences are a rarity in this area. Livestock concentrations are found outside the prime agricultural areas.

Data of Statistics Canada show clear trends towards farm consolidation and improved management. (Selection of crop production geared to market demand, fertilizer use, and increased livestock on soils not well suited for row cropping). Several areas warrant special attention. They are:

- a. Birch Hills Green Area.
- b. Grazing in river valleys compared to grazing on Wanham grazing reserve.
- c. Marginal lands in Township 77 and 78, Range 24 and 25, west of the Fifth Meridian.

Birch Hills Green Area

Many quarter-sections on the steep north-facing slopes are presently utilized for agricultural purposes. These lands are typical conservation lands for the following reasons:

1. Excessive topography with associated accelerated erosion (slopes of 8-15%+).
2. Cool north-facing slopes with slow spring runoff, resulting in late seedings.
3. Higher rating for other uses than agriculture.

The remainder of the present Green Area has soils suitable for agriculture; however, the following considerations are contrary to this use:

1. The narrow conservation area (north slope) requires more "depth" for management purposes.
2. The Birch Hills form the height of land between Smoky and Peace Rivers.
3. Total denuding of large areas appears to have an effect on the water regime.
4. The Agricultural Service Board has requested that the present forested area be reserved as a watershed.

No immediate returns can be realized from conservation areas. Future benefits may be substantial.

The problem encountered in this area is that a large part of the north-facing escarpment is privately owned or under homestead disposition. The land-use problems created thereby cannot be alleviated by land-use control on the south-facing slopes. The ideal situation would be control of land use on the north-facing till slopes and the gleysolic alluvial lower slopes.

The narrow strip of conservation lands with its relatively high capability for wildlife and forestry has insufficient depth for management purposes.

Recreation capability of the Birch Hills, though rated low, is of high value to the local population because it provides the only break in a flat landscape cleared of natural vegetation. The lands presently held in Crown ownership provide a minimum area for management purposes.

River Valleys

A large proportion of the Smoky River and Burnt River Valleys are privately owned. Approximately 59 quarter-sections are Crown lands of which 34 are under grazing lease. Only one-quarter of Crown land in the Burnt River Valley is without disposition.

The economics of grazing in forested areas and especially in heavily wooded ravines are unfavourable. The Lands Division of the Department of Lands and Forests has recognized this grazing problem and consequently developed a grazing reserve north of the Burnt River, seven miles north of Wanham. This reserve, which has approximately 55 quarter-sections in pasture, is still under development. Upon completion, estimated for 1972, the capacity will be 2,500 head of cattle or approximately 10,000 Animal Unit Months. During the 1962 grazing season 8267.25 A.U.M. were utilized; subsequent years saw a decline in use (approximately 50% of capacity).

The subscription for the 1971 grazing season is 1161 head of cattle, which will utilize 4644 A.U.M. during the four-month grazing season. Ample top-quality grazing is still available in the reserve and a gradual shift from grazing in river valleys towards grazing in the reserve will be of benefit to farmers.

In most river valleys in the Peace River



Picture 17. Wind erosion in deltaic deposits (fine loamy sand). Land System IIIe.



Picture 18. Wind erosion and ridges forming in road ditch: light textured soils in deltaic deposits. Land System IIIe.



Picture 19. Sheet and gully erosion south of Birch Hills. A: exposed B horizon. B: accumulated topsoil. C: accumulation of trash; indication of sheet erosion. Land System IIIa.



Picture 20. Road ditch completely filled with topsoil. Highway 49, Land System IIIa.



Picture 21. Spring burning in waterfowl habitat in Township 77, Range 25 (1971). Land System IIIe.



Picture 22. Same area in the fall of 1970.

Country, forage availability is low and of doubtful nutritional value.

Marginal Land in Township 77 and 78, Range 24 and 25, West of the Fifth Meridian

The land districts involved are IIIe and Vb with use-potential rates of respectively 55263 and 67665 (1-4). It should be noted that wildlife ratings are high for these areas, while agriculture is in the "improved pasture" class and forestry one class below the provincial average.

There are approximately 152 quarters in this area. The disposition of quarter-sections of land is as follows:

Grazing lease	16
Crown	8
Grazing permit	1
Fish and Wildlife reservation	4
Cultivation lease	3
Homestead lease	2
Homestead sale	11
The balance of 107 quarters is patented land.	

Agriculture

The following table shows the agricultural development of the area as reflected by homestead sales.

Till 1929	9 quarters
1930-1939	26 quarters
1940-1949	27 quarters
1950-1959	32 quarters
1960-Present	24 quarters

Only a few quarters are fully developed, most lands are partially developed and a fair number have no development at all.

Some years ago it was suggested that this marginal area be transformed into a community pasture. Proximity of the Wanham grazing reserve and existing grazing associations were

factors which decided against acting upon this suggestion. Minutes of the Spirit River East Farm Adjustment Committee reveal that a fair number of farmers in this district are applying to sell their holdings to the Crown under the Land Assembly Program. The community pasture suggestion, which actually was kept alive in the thoughts of many people, should be reconsidered.

Waterfowl

Several prime nesting areas with a number 1 C.L.I. rating are present. The area as a whole is rated C.L.I. Class 3TM. The nesting areas along the shores of the shallow lakes are endangered by drainage ditches, constructed on the request of local farmers. The lake levels are not controlled by weirs. Spring burning of unused forage is common in the area. This practice destroys the wildlife habitat around lakes and potholes and destroys plant fibre, which is needed to stabilize soils vulnerable to wind erosion.

Drainage

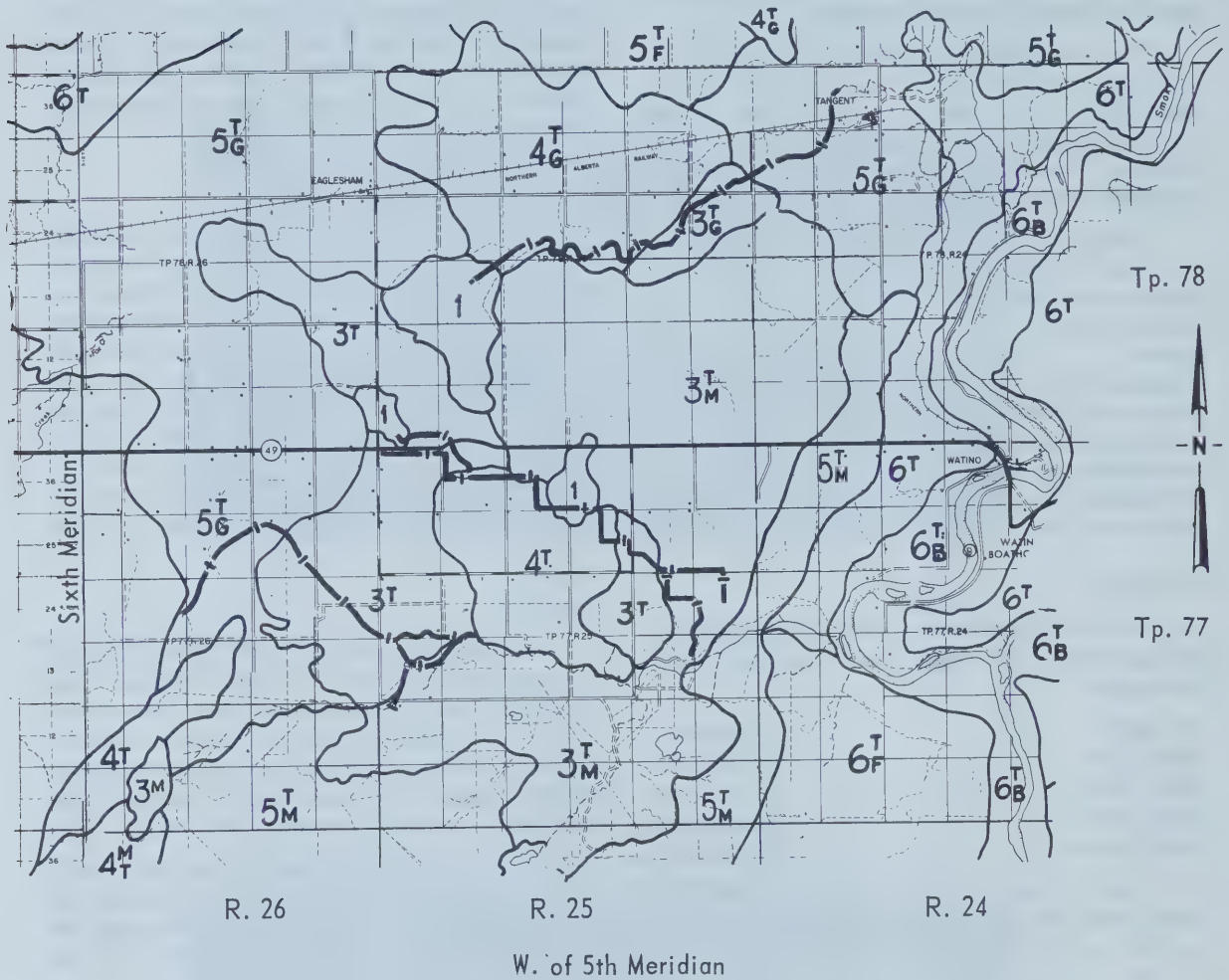
It was observed that the humpy deltaic deposits are underlain by impervious shales. This condition results in a perched water table in the coarse- to medium-textured deltaic deposits. Existing drainage ditches will not only drain surplus water from spring snow melt but will also lower the water table above the shale.

In areas where ditches cut into the underlying shale, droughty conditions will develop as internal drainage, provided below the level of the impervious shale will destroy the perched water table.

A trend towards livestock operations in this district may require the placing of weirs in the drainage ditches.

CANADA LAND INVENTORY

LAND CAPABILITY FOR WATERFOWL



BIRCH HILLS STUDY AREA
WATER RESOURCE MANAGEMENT

Prepared for
LAND USE ASSIGNMENT COMMITTEE
ALBERTA LANDS AND FORESTS

Submitted by:

R. E. Bailey
Director
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Alberta Agriculture



ACKNOWLEDGEMENTS

Co-ordination of this study, including the preliminary investigation and report preparation, was carried out by F. J. Schulte under the direction of D. G. Harrington. Contributors to the report were as follows:

Climate:

R. T. Heywood

Groundwater:

Dr. G. L. Nielsen

Conclusions and Recommendations:

D. G. Harrington

F. J. Schulte

The study area lies in the area bounded by Township 77 to 78 and Range 24 west of the Fifth Meridian to Range 5 west of the Sixth Meridian.

AGRICULTURAL CLIMATE SUMMARY

The average precipitation is 18 inches with 60% of this amount being received during the May to September period. The greatest risk of drought occurs in May and June.

Between 75 and 90 frost-free days are expected. Generally, 100 days or more are free from killing frost (28 degree Fahrenheit).

The number of growing degree days over 42 degrees provides the minimum conditions required for agriculture.

The climatic conditions present should permit the production of feed, grain, and forage crops, but restrict wheat production. Some dependence on livestock for local crop production is indicated. Forage seed production may also be possible. Development should be restricted to that portion of the study area where other factors are not restrictive.

GROUNDWATER SUMMARY

The area of maximum potential ground-

water yield is the Wapiti formation which corresponds roughly to the highest portion of the Birch Hills. Water yields are generally satisfactory for farm use and even for small municipal supplies. The remaining lower areas have little groundwater potential.

RECOMMENDATIONS AND CONCLUSIONS

1. Climatic data suggest that successful agriculture will generally be limited to feed, grain and forage crops with restrictions on wheat production.
2. Groundwater yields are generally satisfactory for farm use in the Wapiti formation which corresponds roughly to the highest portion of the Birch Hills. However the Wapiti formation for the most part has been designated as a protection area. Areas outside of the Wapiti formation are dependent on surface runoff for water supply.
3. The highest portion of the Birch Hills have been designated as protection areas. Increased runoff due to clearing in this area would greatly affect the highly erosive marine shales found in the lower areas. The rest of the protection areas correspond to the river break zones. Extra protection is warranted along the slumping banks of the Smoky River (see watershed protection areas).

APPENDIX A: AGRICULTURAL CLIMATE OF THE BIRCH HILLS STUDY AREA

Introduction

Climatic conditions in the Birch Hills Study area are similar to those in the surrounding area. *Agro-Climatic Areas of Alberta*¹ indicates the frost-free period is between 75 and 90 days with wheat suffering some frost damage 30% of the years. Precipitation has been considered adequate. The Canada Land Inventory² indicates the growing season has the following characteristics:

- a. 75 to 90 frost-free days
- b. 1800 to 2200 degree days over 42 degrees Fahrenheit
- c. 10 to 13 inches of precipitation from May to September
- d. 3 to 5 inches of water deficit for the season

Moisture Relationships

The average annual rainfall is 18 inches with 60% expected during the May to September period. It appears that elevation has a small local effect on summer precipitation.

Average annual potential evapotranspiration is 20 inches. The consumptive use of alfalfa will approach the predicted value if the moisture is available. Grain crops use about 80% as much moisture. The risk of drought to grain is the greatest in June because of the lack of root development and because peak rainfall is expected in July.

Dr. Laycock³ has estimated that one-

1. W. E. Bowser and the Alberta Soil Survey, *Agro-Climatic Areas of Alberta*, 1967 (map)
2. L. T. Chapman and D. M. Brown, report no. 3 of the Canada Land Inventory. 1966, p. 15
3. A. H. Laycock, "Water Deficiency and Surplus Patterns in the Prairie Provinces." March 1967 (Fig. 9 and 10)

quarter of the years have a moisture deficit greater than eight inches and one-quarter of the years less than four inches.

Growing Period

Plant growth starts about April 25, and continues until early October. For many agricultural crops, crop growth is restricted by frost. Generally 75 to 90 frost-free days are recorded. The average date of the last freezing temperature is September 1st. The period between killing frosts (28 degrees Fahrenheit) is somewhat longer than the frost-free period and is usually in excess of 100 days. Since feed grains are not seriously damaged by temperatures down to 28 degrees Fahrenheit, their growing period can be extended beyond the frost-free period but risk of crop loss increases.

Degree-days over 42 degrees Fahrenheit provide a measure of an area's ability to produce growth. It is considered that an annual average of 1800 to 2000 degree-days over 42 degrees Fahrenheit is required for successful mixed agriculture. The study area provides an average of at least 1800 degree-days over 42 degrees Fahrenheit per year. This does not take into account the effect of the longer day in the study area.

Agriculture Potential

The average agricultural potential of the study area is less than that of the surrounding developed area. This decrease in potential is small and is related to small changes in growing energy related to elevation. Local variations in the frost-free period also influence the agricultural potential. The primary crops will be the feed grains and forages, indicating some dependence on the development of livestock. Forage seed production may be possible in some locations. Development should be restricted to the parts of the study area where other factors are not restrictive.

Glossary

Climate: The prevailing weather conditions of an area as determined by meteorological measurements made over a period of years.

Microclimate: The climate and its characteristics over a small area.

Frost-free period: The period of time between the last spring frost (32 degrees Fahrenheit or less) and first fall frost (32 degrees Fahrenheit or less).

Killing frost: Any frost of sufficient severity to cause cessation of growth. A temperature of 28 degrees Fahrenheit or less is considered sufficient to end the growth of most field crops.

Degree-days over 42 degrees Fahrenheit (growing degree-days): An index obtained by subtracting 42 from the mean daily temperature and adding the results for the growing season. For example if the mean temperature is 60 degrees Fahrenheit one day, then that day represents 18 growing degree-days.

Root Zone: The layer of soil in which plant root development will occur. Depth of this zone

will vary but generally good agricultural soil will have a minimum of 3 or 4 feet of soil available for root development.

Soil moisture storage capacity: The amount of plant-available moisture that a soil can retain after gravitational drainage occurs. Generally it is measured in inches of moisture per foot of soil.

Plant-available moisture: The moisture a plant can extract from a soil after gravitational drainage (one-third Bar tension) and before the plant permanently wilts (15 Bar tension).

Moisture deficit: The difference between the amount of moisture available for consumption and the amount of moisture that could be consumed if it was available.

Moisture surplus: Moisture in excess of what can be consumed; it can either be lost or stored for future use.

Potential Evapotranspiration: The amount of water used by evaporation from the soil and transpiration from the plants when there is a dense cover of vegetation and continuously moist soil. Simply, it is an estimate of water need.

APPENDIX B: GROUNDWATER OF THE BIRCH HILLS STUDY AREA

Bedrock Aquifers

See the accompanying map for distribution.

1. Dunvegan Formation: It is about 140 meters (450 feet) thick in the Birch Hills area. It consists of alternating sandstone, siltstone, and shale layers. The sandstones are generally fine-grained, massive, and crossbedded. Their fine nature tends to make well completion difficult. Water quality is usually poor, and yields are sufficient only for livestock and domestic use — perhaps up to 0.4 liters per second (five gallons per minute). Outcrops are limited to the major river valleys.

2. Kaskapau Formation: It consists of marine shales and silty shales, about 330 meters (1000 feet) thick in the Birch Hills area. This formation is not an aquifer in the area.

3. Bad Heart Formation: Three to six meters (10 to 20 feet) thick, and consists of oolitic (pellet-like) conglomeratic iron-rich sandstones. Its low permeability precludes its use as an aquifer, except for minor farm use in the Peoria district, south of Codesa Tower.

4. Puskwaskau Formation: It is about 100 meters thick, and consists of soft marine shale. It is not an aquifer.

5. Wapiti Formation: Consists of lensy sandstone, shale, coal, and siltstone units, few of which extend more than two kilometers laterally. Water yields are generally satisfactory for farm use and even for small municipal supplies. Yields exceed 4.5 liters per second (60 gallons per minute) in some areas. Inasmuch as

the Wapiti Formation occupies only the uppermost parts of the Birch Hills, it is relatively thin. This, along with the lower static head of such areas, indicates that yields here are probably lower than elsewhere for the Wapiti Formation. The only reported spring in the map sheet occurs in this formation, but others probably exist also.

Surficial Aquifers

1. Buried channel gravels: None are positively identified in this area.

2. River terrace alluvium: Minor deposits occur along the Smoky River valley, but their potential is not known.

3. Outwash and aeolian deposits: Occur from Tangent to Eaglesham. Their maximum thickness is 10 meters (30 feet), and they yield minor domestic water supplies. Being near the land surface, water in these deposits is highly susceptible to pollution, and is rapidly depleted in times of drought.

Conservation and Protection

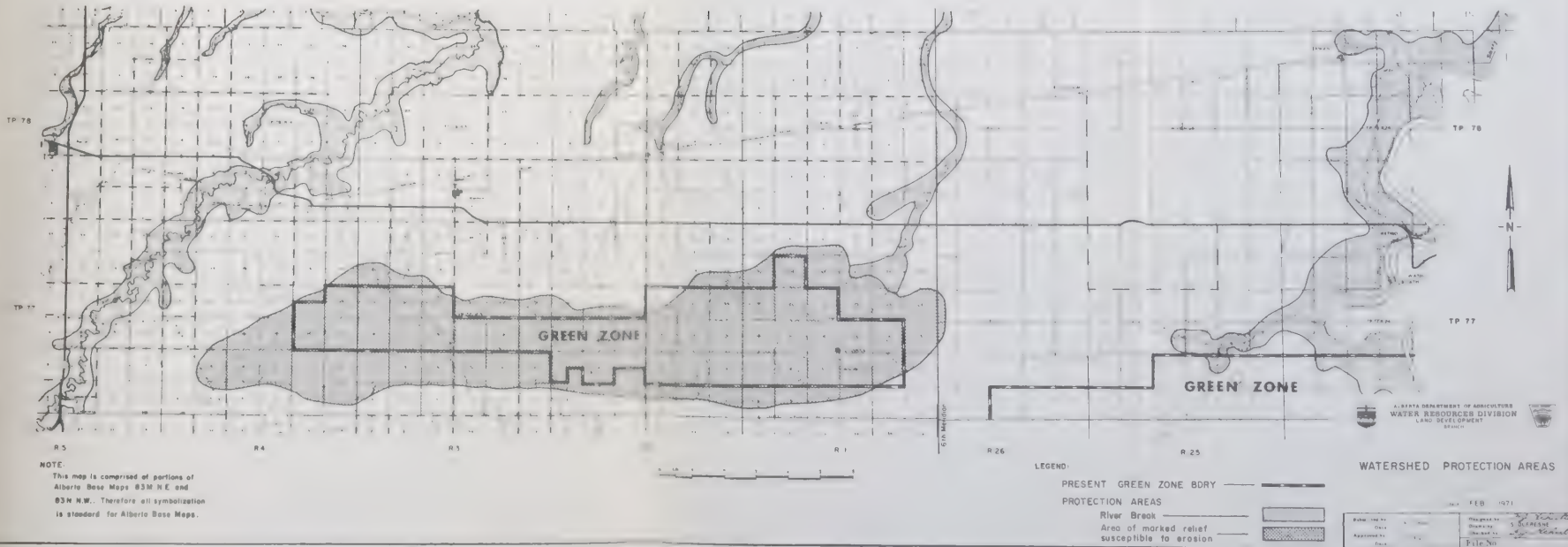
The area of maximum potential groundwater yield is in the highest portion of the Birch Hills. Although the lower areas have little groundwater potential, extreme care should be taken in clearing them for settlement. Marine shales, such as are present here, are very susceptible to erosion.

Water needs for farm use in the areas underlain by the Wapiti Formation can probably be met satisfactorily. Other areas will likely need to resort to dugouts or cisterns.

BIRCH HILLS



BIRCH HILLS



A REVIEW OF WILDLIFE AND WILDLIFE HABITAT
OF THE BIRCH HILLS REGION

Fish and Wildlife Division

by

David F. Penner
Summer Assistant

June 22 — 25, 1971

INTRODUCTION

The purpose of this report is to indicate the present relative abundance of wildlife populations in the Birch Hills and to discuss the wildlife habitats to determine wildlife potential and importance in relation to other resources of the area.

The Birch Hills constitute an island of natural vegetation and wildlife habitat in the midst of an extensive agricultural region north-east of Grande Prairie. These hills, which lie in Township 77, Range 2, west of the Fifth Meridian and Ranges 1 to 4 west of the Sixth, are drained by tributaries of both the Smoky River and Peace River systems.

Vegetative Composition

The forest of the Birch Hills has a variable canopy cover. A few areas contain mature stands of deciduous and coniferous trees in a generally young and transitional forest. The major canopy type is composed of a mixture of balsam and aspen poplar (*Populus balsamifera* and *Populus tremuloides*) with scattered clumps of white spruce (*Picea glauca*), black spruce (*Picea mariana*), birch (*Betula* spp.), alder (*Alnus* spp.) and willow (*Salix* spp.) in the poorly drained areas. Recent burns and clearings over the past 20 years have produced dense stands of young aspen and balsam poplar that restrict shrub, grass and forb growth. Consequently, these areas have low wildlife populations. The transitional and mature forests are more open and have a dense understory of shrubs and forbs which provide excellent habitat for wildlife.

The shrub composition of these forests is extremely variable. The Birch Hills has a high variety of shrubs or browse species in either a mixed or patchy distribution, depending upon canopy cover, exposure, soils and drainage. Shrub density is moderate to heavy in the transitional and mature forests throughout the Birch Hills.

Some of the common shrub species listed in descending abundance are: bush cranberry (*Viburnum* spp.), rose (*Rosa* spp.), red-osier dogwood (*Cornus stolonifera*), willow (*Salix* spp.), russet buffalo berry (*Shepherdia corodensia*), pincherry (*Prunus pensylvanica*), chokecherry (*Prunus virginiana*), saskatoon (*Amelanchier alnifolia*), hazelnut (*Carylus*

cornuta), raspberry (*Rubus strigosas*), alder (*Alnus* spp.), honeysuckle (*Caprifoliaceae* spp.) and mountain ash (*Sorbus scopulina*).

Last winter's leader use of palatable shrubs (e.g. red-osier dogwood, willow and saskatoon) indicates moderate to heavy utilization of available browse. The occurrence of heavy and severely hedged browse species is indicative of several years of heavy and consistent browsing by big game, mainly moose.

In the grass and forb strata, the variety is high and the density variable depending upon canopy cover and shrub composition. Generally the density of grasses is low and the forbs moderate to high. This composition constitutes low value for cattle forage, but is valuable for other forms of wildlife.

Big Game Populations

Moose (*Alces alces*) and deer populations appear to be moderate to high in the Birch Hills. Big game signs were encountered in all areas inspected.

Pellet group counts in transects of 1/50 acre were made in selected moose habitat in a variety of areas throughout the Birch Hills. The average counts in these areas yielded a utilization of 3.7 moose-days per acre (Appendix 1). In comparison, excellent moose habitat on the slopes and flats of the Smoky River indicate a heavy use, of 7.6 to 11.3 moose-days per acre.

Within the Birch Hills, pellet group transects were made in both summer and winter moose range, and illustrate a variable use of the region. Considering the available browse, browse utilization, degree of hedging of shrubs, escape and resting cover, type of terrain and hunting pressure, the present moose population would rate fair to good in comparison to other areas of high moose densities. However, the Birch Hills appear to be capable of maintaining a higher moose population than at present.

Mule deer (*Odocoileus hemionus*) sign was light, but consistent throughout the Birch Hills. On the basis of mule deer requirements, their habitat would rate fair to good. The proposed Alberta Forest Service reforestation project promises to provide excellent deer habitat as illustrated by the present use of cleared and planted strip plots.

One grazing lease on Section 21, Township 77, Range 3 was inspected. An ocular reconnaissance of browse utilization and pellet transects showed the majority of the area to be lightly used by moose, and heavily used by cattle. Only one exposed ridge had been heavily used by moose. Livestock browse and trampling appear to be detrimental to the moose browse.

Lorne Brownscombe, the Codesa Tower observer, and A.F.S. officials indicate that elk (*Cervus canadensis*) sign is rare in the Birch Hills. These animals were probably transients from the Saddle Hills herd.

The forest of the Birch Hills appears to be too dense to attract and hold a resident elk population. Moreover, the narrow strip of uncleared timber that comprises the Birch Hills is traversed by several heavily-used roads. The small size of the area, combined with agricultural disturbance and hunting pressure, appear to make the area unattractive to elk.

Upland Game Birds

The mixed forest of the Birch Hills provides excellent habitat for ruffed grouse (*Bonasa umbellus*). Feeding, escape and roosting cover are adequate to support a moderate to high ruffed grouse population. Food species such as willow, young aspen, berry-producing shrubs, and other food preferences are abundant. The present population, as indicated by the frequency of pellet groups observed, appears to be of a moderate density. Several ruffed grouse were observed during the survey.

Waterfowl

The Eaglesham Lakes in Townships 77 and 78, Range 25, were checked for waterfowl capabilities. These cattail lakes with extensive sedge meadows provide excellent nesting cover for waterfowl. Eleven species of diving and dabbling ducks were observed (checklist Appendix II). This variety, combined with a high bird density, indicates these lakes to be excellent waterfowl breeding areas. Numerous broods and several nests were observed.

An unnamed lake in Sections 19 and 30-77-3-W6 in the western portion of the Birch Hills also supported a high waterfowl breeding population. About 200 Franklin gulls (*Larus pipixcan*), in what appears to be a breeding

colony, were observed.

C.L.I. classification rates this lake 3T. From observations made on the survey, the lake appears to deserve a rating of 1, a prime waterfowl breeding area. More important, this area has little human or agricultural disturbance, a requirement of several of the resident breeding species, e.g. bufflehead duck (*Bucephala albeola*), and Franklin gull (*Larus pipixcan*).

A small drainage ditch on the northeast corner of the lake (30-77-3-W6) leads to a runoff on the north slope of the Birch Hills. The relevance of this drainage ditch to the nearest agricultural uses is not evident, but the loss of water from this waterfowl breeding area may be significant.

Additional Wildlife Species

Fur-bearing Animals

The Birch Hills appear to maintain a moderate to high population of fur-bearing animals. One registered trapline transects this region.

Black bear (*Euarctos americanus*) fecal counts, trails and other signs indicate a high population in the Birch Hills. Lorne Brownscombe reports personal and frequent local reports of black bear sightings in this region.

Coyote (*Canis latrans*) populations appear to be moderate as determined from available game signs.

The varying hare (*Lepus americanus*) population appears to be high in the Birch Hills as well as in most areas of the tangent. Use of willow, aspen and other browse species by hares is moderate to severe and is causing hedging and decadence of browse in some areas.

Red squirrel (*Tamiasciurus nuasonicus*) populations are scattered and light. These populations coincide with the scattered clumps of white and black spruce.

Information or sign of other fur-bearers is scanty, but there are indications of beaver (*Castor canadensis*), mink (*Mustela lacustris*), and badger (*Tacidea taxus*).

Non-game Birds

The Birch Hills provide an excellent variety

of habitats for non-game birds. A limited checklist of birds observed during the short survey is found in Appendix 3.

High densities of birds occurred in specific habitat types such as the muskeg regions in 16-77-3-W6. Here, available food and cover maintains a higher bird population than in the heavily forested regions. Many of these birds cannot be found in the surrounding cultivated areas due to the destruction of habitat by agricultural practises.

SUMMARY & DISCUSSION

The Birch Hills provide a natural conservation area where land uses other than agriculture may be considered. The terrain and variety of vegetation types provide numerous habitats for a diverse wildlife population.

The priorities of the Alberta Forest Service for the Birch Hills region (personal communication) include watershed protection, recreation, and timber production. If properly planned, these uses may benefit some wildlife populations. The reforestation project proposes to plant pine and spruce in strip blocks on alternate sections. This development may increase the browse and feeding habitat for moose and deer and may attract elk.

There are several areas in the Birch Hills in which alteration of existing vegetation will be detrimental to wildlife and will destroy areas of natural beauty valued for recreational purposes. Alterations or disturbances of such areas as the muskeg on the Wanham road, the unnamed lake on the northwest corner of the Birch Hills and the natural spring on the Belloy road (15-77-2-W6) should be minimized or carefully planned to conserve the delicate ecological balance of these areas.

Some of the increasing public demand for recreational areas in the Grande Prairie region could be accommodated in the Birch Hills. As well as being a good hunting area, the Birch Hills have a high value for other types of recreation

such as camping, hiking, sight-seeing and photography. Before the area is heavily used, accommodation in the form of campsites may have to be provided.

A present recreational use of the Birch Hills may be found in the developing ski slopes on the northeastern section of the hills.

Although the Birch Hills are presently rich in wildlife and natural vegetation, the encroaching farmlands are clearing the steeper slopes as they advance up the hills. From the observed erosion patterns and patchy crops, it appears that better uses can be made of these lands. Specifically, wildlife should be given a prime consideration as designated by the C.L.I. ratings. Any proposed alteration or clearing should be thoroughly studied to determine the effect on wildlife and watershed as well as determining the best land use possible.

RECOMMENDATIONS

- a) Controlled land use to utilize the Birch Hills to the best potential or potentials. Specifically, the unsuitable lands for cultivation on the slopes and ridges of the Birch Hills should be conserved for wildlife, watershed, recreation and timber production as designated by the C.L.I. ratings.
- b) The conservation and re-rating of the unnamed lake on 19 and 30-77-3-W6 from the C.L.I. rating of 3T to 1, a prime waterfowl breeding area. Inspection and control of the man-made drainage ditch leading from the northeast corner of this lake (30-77-3-W6).
- c) Increase non-hunting recreational use of the Birch Hills by providing camping and picnic accommodation. A specific example would be a carefully planned area near the Belloy road spring site (15-77-2-W6) considered by the A.F.S. and presently used by farmers for hauling water.

BIRCH HILLS WILDLIFE AND VEGETATION SUMMARY

Average of Moose pellet counts of all Transects 373 Moose Days Acra

APPENDIX II
WATERFOWL CHECKLIST – EAGLESHAM LAKES
(Breeding Species)

Mallard	<i>Anas platyrhynchos</i>
Shoveler duck	<i>Spatula clypeata</i>
Blue-winged teal	<i>Anas discors</i>
Ruddy duck	<i>Oxyura jamaicensis</i>
Lesser scaup	<i>Aythya affinis</i>
American widgeon	<i>Mareca americana</i>
Pintail	<i>Anas acuta</i>
Gadwall	<i>Anas strepera</i>
American coot	<i>Fulica americana</i>
Eared grebes	<i>Podiceps caspicus</i>
Horned grebes	<i>Podiceps auritus</i>

APPENDIX III
NON-GAME BIRDS CHECKLIST – BIRCH HILLS
(Incomplete)

Swainson's thrush	<i>Hylocichla ustulata</i>
Hermit thrush	<i>Hylocichla guttata</i>
Black-billed magpie	<i>Pica pica</i>
Solitary sandpiper	<i>Tringa solitaria</i>
Common crow	<i>Corvus brachyrhynchos</i>
Robin	<i>Turdus migratorius</i>
Wilson's snipe	<i>Capella gallinago</i>
Common nighthawk	<i>Chordeiles minor</i>
Red-wing blackbird	<i>Agelaius phoeniceus</i>
Cowbird	<i>Molothrus ater</i>
Yellow-shafted flicker	<i>Colaptes auratus</i>
Downy woodpecker	<i>Dendrocopos pubescens</i>
Back-capped chickadee	<i>Parus atricapillus</i>
House wren	<i>Troglodytes aedon</i>
Eastern kingbird	<i>Tyrannus tyrannus</i>
Least flycatcher	<i>Empidonax minimus</i>
White-throated sparrow	<i>Zonotrichia albicollis</i>
Sparrow hawk	<i>Falco sparverius</i>
Killdeer plover	<i>Charadrius vociferus</i>
Bufflehead duck	<i>Bucephala albeola</i>
Yellow warbler	<i>Dendroica petechia</i>
Franklin's gull	<i>Larus pipixcan</i>
Black petrel	
Red-tailed hawk	<i>Buteo jamaicensis</i>
Ruffed grouse	<i>Bonasa umbellus</i>
Slate-coloured junco	<i>Junco lyemalis</i>

WATERSHED VALUES FOR THE BIRCH HILLS
STUDY AREA

Prepared for
LAND USE ASSIGNMENT COMMITTEE
by
FOREST LAND USE BRANCH

Submitted April, 1971
JAMES E. STEARNS

GENERAL DESCRIPTION

The Birch Hills is located within Township 77, Ranges 1 to 4, west of the Sixth Meridian as shown on the attached map. The area outside the shaded-in area is almost entirely farmland except for a few scattered woodlots, according to 1967 airphotos of the area. The shaded area within the red boundary is the Green Area boundary as of June 3, 1970. The area of the Birch Hills within the Green Area is 40.75 square miles (26,080 acres). To the south of the height of land the Birch Hills slope very gradually, while to the north the Birch Hills slope much more steeply.

PHYSICAL DESCRIPTION

Physiography

Elevation

The elevation of the area ranges from 2,125 to 2,480 feet, an elevational change of 355 feet. The areas of maximum relief lie to the north of the height of land, while to the south of the height of land the relief is much more gradual.

Slope

On a 100-foot contour interval the average slope gradient is as high as 15%. On a 25-foot contour interval the average slope gradient is as high as 50%.

According to the slope classification map of the area, a slope gradient of 15%-plus in the area of maximum relief can be expected.

To the south of the height of land the slopes dip gently at less than 8%.

84.0% of the area has slope gradients of less than 8%.

% of Area	Slope (%)
54.6	0-5
29.4	3-8
12.6	8-15
3.4	15+

Aspect

To the north of the height of land the general aspect of the slopes is north to north-west. To the south of the height of land the general aspect of the slopes is south.

Streams

The area of the Birch Hills under consid-

eration is drained entirely by 30 miles of intermittent stream courses. The drainage density for the area is 0.74 miles per square mile.

Geology

Bedrock

The bedrock geology for the described area consists of the Wapiti Formation over the Puskwaskau Formation.

Surficial

The surficial deposits for the described area consist of lacustrine and till deposits. Within this area there appear to be no buried channels, valleys, or sands and gravels.

Soils

The soils for the described area are of the following:

Braeburn-Donnelly Soils Complex (Bd-Do)

- areal extent of approximately 24,120 acres (92.5%).
- medium drained soils of medium erosion hazard capability.
- found on medium to very steep slopes.

Eaglesham Soils (Eg)

- areal extent of approximately 680 acres (2.6%).
- will erode fairly easily if exposed.

Codesa-Donnelly Soils Complex (Co-Do)

- areal extent of approximately 640 acres (2.4%).
- medium drained soils of high erosion hazard capability.
- found on smooth gentle slopes to very steep slopes.

Belloy-Esher Soils Complex (Be-Es)

- areal extent of approximately 480 acres (1.8%).
- found on slopes which are usually smooth and seldom exceed a gradient of 5%. These soils are moderately to imperfectly drained soils, and erode quite easily.

Esher-Belloy Soils Complex (Es-Be)

- areal extent of approximately 160 acres (0.4%).
- this soils complex is the same as the above soils complex except that the characteristics of the Esher soil are dominant.

Vegetative Cover

The area is potentially productive, but contains little if any merchantable timber at present due to fires from 1941 to 1956. There are, however, small patches of medium and sparsely stocked deciduous stands 61 to 80 feet tall, and some sparsely stocked deciduous stands up to 30 feet tall. Generally the natural vegetation consists of a mixed tree cover in which aspen is predominant. Balsam poplar, birch, willow, alder, spruce, and pine occur either in mixtures or as the dominant cover of local areas.

CLIMATE

The Peace River District of Alberta forms part of the northwestern portion of the forest and parkland region (Boreal Forest Region) of Alberta. Its climate is typical of the western Canadian prairies, and is characterized by a moderately warm summer and a relatively cold winter.

The meteorological compilations are based on data supplied by the Meteorological Branch, Canada Department of Transport, for the meteorological stations at Beaverlodge (elevation 2,500 feet), Fairview (2,160 feet), Grande Prairie (2,190 feet), High Prairie (1,965 feet) and Peace River (1,866 feet).

Precipitation and Temperature

Figure 1 gives the mean monthly precipitation distribution and the mean monthly temperature trend for the period 1921 to 1951. The precipitation and temperature values for this 30-year period were checked against the precipitation and temperature values for the 30-year period 1931 to 1961, and the two sets of values matched quite closely.

The mean annual areal precipitation for the Birch Hills is 16.7 inches as calculated by using the Thiessen Polygon Method. Mean annual precipitation distribution is:

November to April: 32% or 5.3 inches
April to November: 68% or 11.4 inches

The five-year average (1965-1970) for the months of May to September at the Codesa Lookout (elevation 2,430 feet) is 11.7 inches of precipitation.

The mean monthly maximum precipitation

in 24 hours is presented in Figure 2 for the period 1931 to 1961. These values were obtained by averaging the maximum precipitation in 24 hours as recorded at Beaverlodge, Fairview, Grande Prairie, High Prairie, and Peace River.

Mean annual temperature is 35.0 degrees F., maximum temperature is 96.8 degrees F., and minimum temperature is 56.4 degrees F.

Wind

These values are normals for the period 1955 to 1966 from the stations at Beaverlodge, Fairview, Grande Prairie, and Peace River.

Mean annual wind speed is 7.8 m.p.h. Most winds come from a westerly direction. Mean hourly maximum wind speed is 45 m.p.h.

Relative Humidity

These values are normals for the period 1957 to 1966 from the stations at Fairview, Grande Prairie, and Peace River. Figure 2 presents the mean monthly relative humidity trend for the area.

HYDROLOGY

Water Use and Demand

The water use and demand in the Birch Hills are primarily for domestic purposes and stock supplies. Recreational interests in the area would be limited to water supplies for campground installations. Wildlife would to some extent make use of the 0.8% of the area classified as swamp, marsh, and bog.

Water Yield

The area is a headwaters area for several drainage systems, and is drained by intermittent streams during spring melt and during periods of intense rain storms.

For the purpose of this report, reference is made to the Spring Creek Study in order that a water balance may be established for the Birch Hills. Spring Creek is representative of northern forest physiographic and morphologic conditions.¹ Both areas are similar in forest cover type, soil types, surficial deposits, elevation, areal size, mean annual temperature, and precipitation distribution. They do vary in terms of

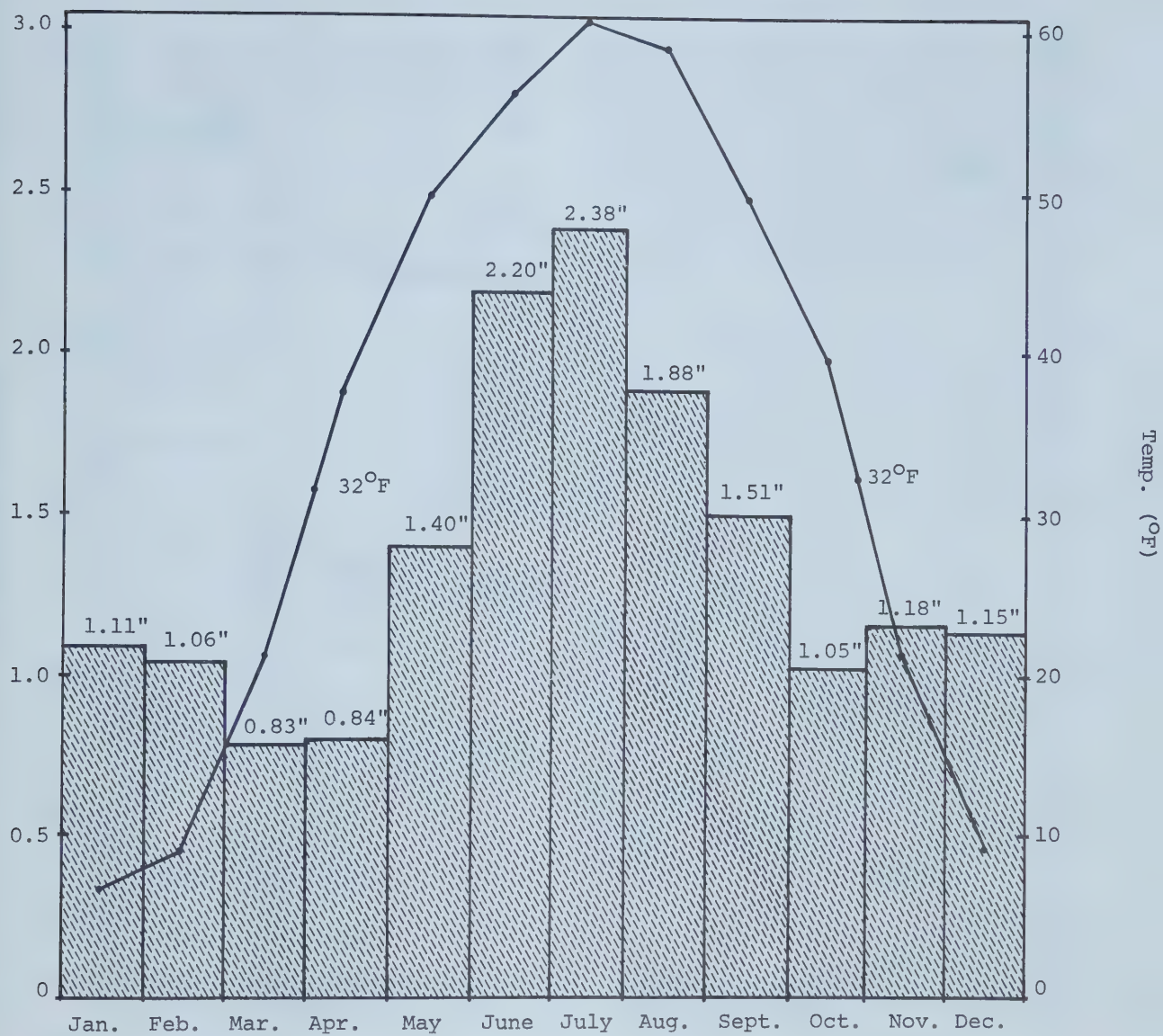


Figure 1

Mean Monthly Precipitation and Temperature for the period 1921 to 1951 as calculated from data collected at Beaverlodge, Grande Prairie, Fairview, Peace River, and High Prairie.²

Inches Precipitation in 24 hours

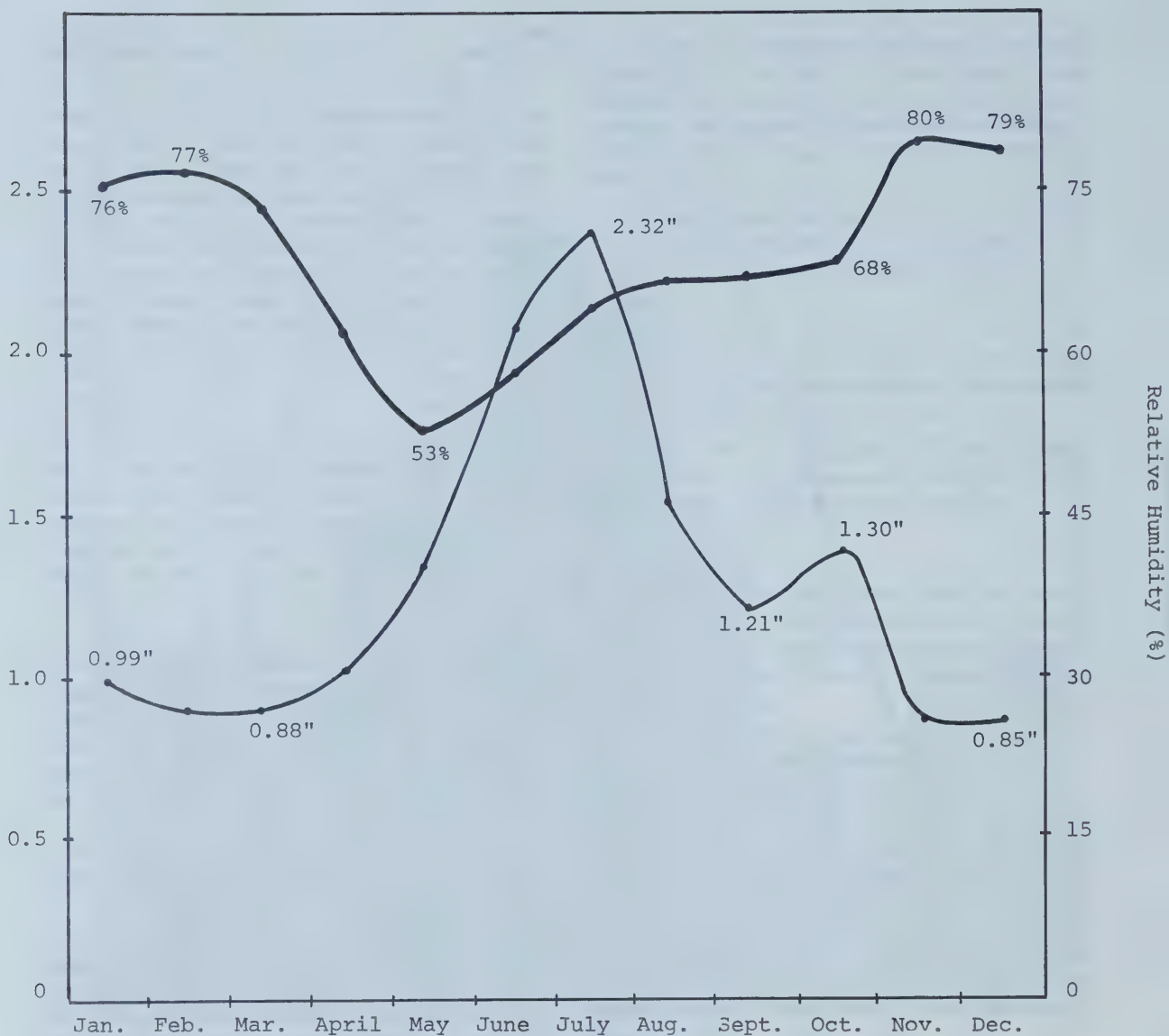


Figure 2

Mean Monthly Maximum Precipitation in 24 hours for the period 1931 to 1961, and the Mean Monthly Relative Humidity for the period 1957 to 1966 as calculated from the stations at Beaverlodge, Fairview, Grande Prairie, and Peace River.

drainage shape, drainage type, and drainage density which will make a difference in water regime. However, it can be assumed that evaporation, transpiration, and seasonal runoff values are similar.

The water balance calculations for the Birch Hills are as follows:

Precipitation (P)

— 16.7 inches by Thiessen Polygon Method.

Surface Runoff (R.O.)

November to March	0.06 inches
April to May	2.18 inches
June	0.58 inches
July to September	0.06 inches
October	0.03 inches
Total	2.91 inches

Moisture Retention (E)

— moisture loss by interception, transpiration, evaporation, and soil moisture recharge.
—calculated at 13.79 inches.

Groundwater Flow (G)

$G = P - (R.O. + E)$
 $G = 16.7 - (2.9 + 13.8)$
 $G = 0.0$ inches

Snowpack

Winter Precipitation (Pw)

— calculated at 5.34 inches.

Winter Evaporation (Ew)

— calculated at 2.29 inches.

Winter Retention Constant (Sw)

— calculated at 2.50 inches.

Winter Runoff (R.O.w)

$R.O.w = Pw - (Ew + Sw)$
 $R.O.w = 5.3 - (2.3 + 2.5)$
 $R.O.w = 0.5$ inches.

SUMMARY

The prime watershed value of the Birch Hills is for the maintenance of vegetative cover to prevent soil erosion, and therefore maintain the present level of the quality of water coming off the area. The area of concern is underlain by two formations of low permeability which are not suitable as groundwater sources. Only two

springs have been found within the Wapiti Formation on the north side of the hills, and these are likely due to local characteristics of the formation. Both the Wapiti and the Puskwaskau Formation would be subject to excessive erosion once exposed. The instability of the Puskwaskau Formation is illustrated by the steep banks which the Smoky River has cut into it. Extreme slumping of the Puskwaskau Formation into the Smoky River is evident in the 1967 air photos of the area.

The surficial deposits within the area are also of very low permeability and provide water sources for only domestic or stock purposes. These sources of water are again very local in nature. The surficial deposits are also very erosive, the most erodible soils being lake, pond, and muskeg soil deposits, and soil derived from underlying bedrock and tills containing a high percentage of silt and clay.¹

The main soil found in the area is the Braeburn-Donnelly soils complex; the Braeburn soil by itself being a well drained loam to heavy loam developed on glacial till, and the Donnelly soil being a poorly drained heavy loam to clay loam developed on stratified till or modified lacustrine material. The combination of the two soils with their inherent characteristics results in a soil complex of low permeability and highly erosive characteristics if cleared of its natural vegetation. The same is true of the other soils in the Birch Hills only on a smaller scale.

The low permeability of the bedrock, surficial deposits, and soils in the area is evidenced by the muskeg areas, low well yields, extremely low groundwater flows, and the small number of springs present.

The greatest problems with soil erosion would occur on the north side of the height of land where slopes are much steeper. The clearing of these north aspects would probably increase the number of frost-free days, thus increasing the magnitude of spring runoff from these sites. To the south of the height of land erosion problems would not be as great, but would still be prevalent due to soil characteristics and the nature of the precipitation for the area if it were cleared for farming. (Erosion problems would be increased to the south of the height of land, but control and prevention of soil erosion would be much easier to implement.) Most of the water erosion problems would occur in the spring

during snow melt and during intense rain storms (Figure 2), but would later be minimal due to the low annual precipitation for the area. This fact can be assumed because the area is drained only by intermittent streams. Wind action would account for soil movement as well, and since the area is fairly flat it would be well exposed following land clearing.

The vegetative cover in the area is also responsible for the fact that the streams are intermittent. Vegetation retains moisture on the land by interception, by making the soil more porous thus increasing infiltration and percolation rates, and removes moisture from the land by transpiration processes. With the removal of vegetation the loss of moisture due to plant transpiration, plant interception, and due to the infiltration and percolation of moisture into the ground would be converted to surface runoff. The factor of moisture infiltration and percolation into the ground would be less due to soil compaction. The factor of moisture evaporation would be increased by increased temperatures and wind effects, but would not be great enough to account for the added increase in water available for surface runoff. The factor of evaporation would have a smaller effect yet on the change in the water balance for the area, because almost all of the runoff would occur during periods of spring melt and intense summer storms. The removal of vegetation for farmland would increase runoff from the Birch Hills, thus causing increased erosion problems if the area were not farmed using good methods to prevent soil movement.

CONCLUSIONS

The Birch Hills serve as the upper headwaters for a number of small tributaries of the

Peace and Smoky rivers. The area is not of major importance from the standpoint of surface or groundwater flow regulation; however, it has considerable value as a watershed protection.

Although precipitation, surface runoff, and groundwater values are low for the area, the removal of native vegetation by wholesale agricultural clearing would increase the potential for overland flow, water erosion, and stream sedimentation. The evidence of existing erosion problems in the area indicates that increased siltation could be expected from bared surfaces on the erosive soils, particularly on the northern slopes of the hills.

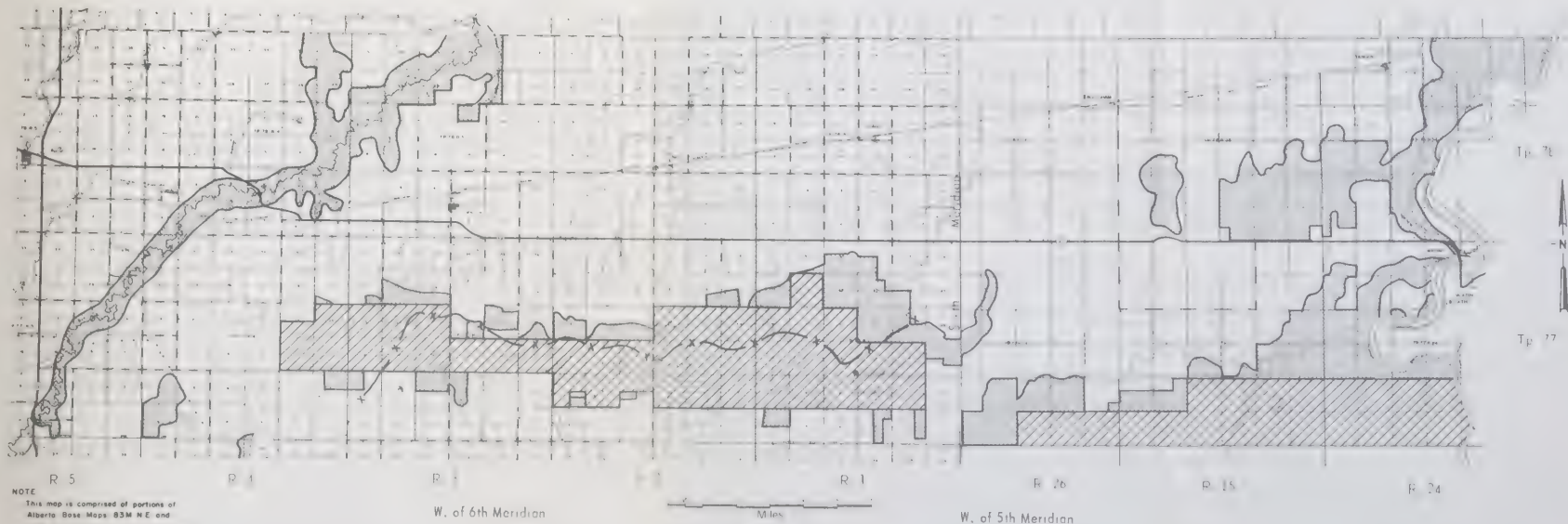
The effects of vegetation removal on the local climate of the area are difficult to predict. Certainly the microclimate of the Birch Hills would be affected, but the regional effects would be immeasurable.

On the basis of the preceding brief analysis, which admittedly did not include a field inspection, it is felt that the present Green Area boundary surrounding the Birch Hills should be maintained. The values of the area for watershed protection and multiple use purposes appear to outweigh the limited benefits that might accrue from agricultural development.

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BIRCH HILLS



NOTE
This map is comprised of portions of
Alberta Base Maps 83M NE and
83N NW. Therefore, all symbolization
is standard for Alberta Base Maps.

		map prepared by LAMEN-AMER-AMER-AMER Land Use Assignment Section Technical Division
Prepared by <i>E. Van Waas</i>	Preliminary	Final

- x — Height of Land
- ▨ Areas of Native Cover in the White Zone
- ▨ Green Zone

LAND USE ASSIGNMENT COMMITTEE
REPORT NO. 2
BIRCH HILLS STUDY
SUPPLEMENTARY INPUT OF FORESTRY SECTOR
Alberta Forest Service

Written by:

S. C. Corey

Alberta Forest Service Representative
Land Use Assignment Committee: F. W. McDougall

Alberta Lands and Forests
Forest Land Use Branch
Multiple Use Planning Section
July 1972

INTRODUCTION

The purpose of this report is to indicate the relative importance of the forestry sector in the Birch Hills and to discuss the forest resource in relation to the various other resources of the area.

A forest is a tract of land covered by a plant association predominantly composed of trees and other woody vegetation.¹ A forest generally, however, has the inherent capability to provide such benefits as timber, wildlife habitat, run-off water and outdoor recreational landscapes, to name a few. In discussing the forestry sector each of the above will be considered. However, as water, recreation and wildlife have been considered in the already published report on the Birch Hills only timber will be discussed in any detail. Statements made on other sectors will be drawn from information stated in the original report.

CURRENT FOREST CONDITIONS

The forest of the Birch Hills, lying within the Green Area boundary, is generally a young and transitional forest. The major cover type is a mixture of balsam and aspen poplar (*Populus balsamifera* and *Populus tremuloides*). A few small scattered patches of aspen and white spruce (*Picea glauca*) are found in the north-eastern portion of the hills in Township 77, Ranges 1 and 2. The poplar and aspen are predominantly young and of poor quality and the potentially productive types on the area have little or no coniferous stocking. The area is presently of no value for commercial timber.

The past history of the area involved logging of the timber, and fires have repeatedly burned the area during the past twenty years. Aspen and balsam poplar followed in natural succession after the fires and in many areas dense young stands of aspen and balsam poplar now restrict the growth of grasses, forbs and shrubs. Because of a lack of natural spruce seed trees there is little spruce regeneration and consequently the process of a classical succession is being interrupted.

A reforestation program to restock the area to coniferous species was begun in 1970. This

was aimed at increasing water quantity and quality, enhancing recreation potential and producing a marketable wood product. In January 1972 a petition was submitted by the citizens of Belloy and surrounding districts of the Birch Hills area protesting the reforestation program being implemented in the Birch Hills. They objected to the program as they felt it would be detrimental to big game in the area and also they did not want commercial logging operations occurring in the hills. The program of scarification and reforestation was consequently temporarily halted.

The forest capability ratings for the Birch Hills indicate Class 4 for most of the area. In the province of Alberta this is a high rating, with Class 3 being the highest capability that can be achieved. Classes 1 and 2 are restricted because of the Alberta climate. Class 4 is the dominant classification in the province, the major limitation being a lack of sufficient soil moisture during the growing season. The Birch Hills area should then be considered a good area for timber products from the capability viewpoint.

According to a study carried out in this area by the Federal Government, Forest Research Laboratory, growth in the Marsh Head area of the Whitecourt Forest exceeds capability in some areas. This may also be true for some portions of the Birch Hills area.

OTHER RESOURCES OF THE BIRCH HILLS

The Birch Hills are the only height of land and/or island of natural vegetation in the centre of an extensive agricultural area. The area is not of major importance from the standpoint of surface water or groundwater flow; however, the removal of natural vegetation would be very undesirable from the standpoint of soil stability since the marine shales present in the area are very susceptible to erosion. Erosion problems already exist on the north slopes of the hills where land clearing has occurred for agricultural use.

The area provides numerous habitats for the diverse wildlife population. It is stated in "A Review of Wildlife and Wildlife Habitat of the Birch Hills Region" that the area is presently rich in wildlife. Moose and deer populations were stated to be moderate to high.

Recreation use of the area is restricted to

1. *Forest Terminology*. Society of American Foresters (Washington), 1958, p. 34

use by the local residents. In the past it has been used for little but hunting. In addition to being a good hunting area the Birch Hills also have the potential for development of other extensive recreational activities and local people are beginning to use the area for camping and picnics. Outdoor recreation development in the area is low at present and it is possible that campgrounds or picnic areas could be developed in the area. While the Canada Land Inventory capability ratings are low the area should be capable of meeting current local demand.

CONCLUSIONS

Analysis of the available data on the Birch Hills suggests that multiple use of the forested land with a major emphasis on watershed protection should be the management objective for this area. That is, proposals in the area should be to provide maximum watershed benefits.

The ungulate capability in the area is high and the area presently supports a significant wildlife population. Any program proposals in the area must consider such current wildlife populations as exist in the area. Development to provide extensive use recreational facilities for the local people should also be considered. This would include camping and picnicking facilities.

While the area has no commercial timber value, reforestation of the area should be continued. This should be carried out bearing in mind the effect that complete reforestation of the area would have on wildlife populations. Trees should be planted in strips so that strips of

coniferous timber will alternate with strips of brush and poplar in order to provide browse for ungulates. While scarification may increase available browse it must be remembered that after approximately ten years this is not the case. Available browse then decreases. Some areas of pure aspen stands should therefore be left scattered throughout the area to insure an adequate food supply for the wildlife population.

The primary objective of the current reforestation program is to improve water quality and quantity. The trees have been planted in a manner which is intended to maximize the windbreak effect and increase the snow accumulation. By planting the rows at right angles it will also provide shade and delay snowmelt in the spring, thereby providing melt-water later in the summer when run-off from the aspen brushland areas has diminished.

Much of the objection by the local people to the reforestation program has been based on the assumption that the trees will eventually be cut by a large commercial interest. In fact, however, none of the Birch Hills is in a timber agreement area. At this time, Alberta Lands and Forests has made no specific plans for disposition of the area as it is rather unrealistic to plan the disposition of timber which will not be harvestable for another eighty years. However, it is conceivable projecting from this point that the area could be used for a community woodlot. Such a use would be feasible while still considering the primary use as watershed protection.

COMMENTS RE: AGRICULTURAL INPUT TO BIRCH HILLS STUDY MATERIAL

RESOURCE ECONOMICS BRANCH
ALBERTA AGRICULTURE

by
W. S. Pattison

The material as presented includes some useful information. However, it is inadequate for the purpose of making economic comparison of agricultural land use with alternatives.

To facilitate economic comparison, the following land sales information is offered. The raw data are on file in the Resource Economics Branch, Alberta Agriculture.

A total of 10,258 acres (about 64 quarter-sections) in parcels greater than 60 acres in size changed title in the study area during 1971. A summary of average market values by C.L.I. agricultural capability rating is given in the accompanying table.

If a competitive agricultural land market

exists, then the price of the land should reflect the current and expected profitability of agriculture. It seems a fairly active market for soil classes 2, 3 and 4 existed during 1971 in the Birch Hills area. If we assume that (1) the land transacted was 50% cleared, (2) had additional permanent improvements, and (3) land clearing and development costs of \$50/acre, then the agricultural market value of "raw" land in the study area is approximately as follows:

Class 2	\$45 per acre
Class 3	\$10 per acre
Class 4	\$5 per acre

These figures are measures of net *direct* benefits only and do not include secondary benefits such as employment, etc.

1971 AGRICULTURAL REAL ESTATE VALUES, BIRCH HILLS STUDY AREA

C.L.I. Rating	Total Acres Transacted	Mean Market Value (\$ per acre)	Standard Deviation
2	3,031	68.99	38.70
3	3,728	36.66	16.13
4	2,382	29.93	6.85
5	477	43.50	.74
9*	320	20.31	—
unspecified	320	27.31	2.32

Source: Resource Economics Branch, Alberta Department of Agriculture

*Organic Soils.

BIRCH HILLS LAND USE STUDY

RECOMMENDATIONS TO THE
DEPUTY MINISTER – ALBERTA LANDS AND FORESTS

Submitted by

LAND USE ASSIGNMENT COMMITTEE

EDMONTON

OCTOBER 1972

OBJECTIVE

The Birch Hills Land Use Plan was initiated to resolve a question of long standing, i.e. whether the hills should be used for agriculture or some other use. A generally prosperous farming community entirely surrounds the area and considers the hills as the only area of Crown land where opportunity for expansion exists. Within the farming community, however, considerable difference of opinion exists on the best use of the area.

CHARACTERISTICS OF THE AREA

The Birch Hills proper is an elevation of land running in a general east-west direction, which rises gradually from the south to an elevation of 2450 feet and forms a north-facing escarpment which drops off sharply to 2100 feet elevation. The land to the north is generally level to depressed, while to the south it slopes away gently for many miles.

Very broadly, the western half of the map sheet consists of lands of good and excellent agricultural quality, while in the eastern half, the lands deteriorate in an easterly direction to the dunefields in the southeast corner.

RECOMMENDATIONS

The accompanying map constitutes the Land Use Assignment Committee's proposal for land use. It shows two categories of land: one where no agricultural disposition is recommended and one where some specified form of agriculture is recommended either as a priority or as a lower rated use. The attached Permitted Use Agreement sets out in detail the proposed uses for Crown lands only although all lands are included.

The Land Disposition Map represents the present status of ownership, commitments on Crown lands and the location of the Green Area boundary. Land Use coding and Land Disposition maps together indicate the extent to which present use coincides with recommended use and consequently the requirements to make the necessary changes.

The Committee recommends that:

1. The Birch Hills proper, which form a groundwater recharge area for the

surrounding lands, be managed by the Crown.

2. SW28 and SE30-77-1-W6 be added to the Green Area.
3. SE8-77-25-W5 be added to the Green Area in an "O" management unit.
4. S½7, S½8-77-1-W6 and SW7, S½11, S½12-77-2-W6 be deleted from the Green Area.
5. Lands deleted from the Green Area on the south side of the Hills not be disposed of until an equivalent amount of land has been revested on the north side.
6. Changes from present to recommended use on privately owned lands in the White Area should largely come about from agricultural extension work aided by the Farm Development Program.
7. Changes from present to recommended use on privately-owned lands indicated as "no agricultural disposition" or as "required for environment conservation" in both zones are suggested to be made through a program of revestment over time.

Proposed additions to the Green Area involve Crown lands only, while deletions cover both private and Crown lands.

The extent of private lands required for environmental conservation is 354 quarter-sections or parts of quarter-sections. A list of the location of these lands is attached.

The Birch Hills Land Use Study and the Committee's recommendations were discussed with the Spirit River Agricultural Development Committee on August 14th, 1973.

Their response as quoted from the minutes of the November 6th, 1973 meeting is as follows:

The committee agreed generally with the study with the following notes:

Item 1. Agreed that the land should be managed by the Crown but local committee should be consulted in any changes of status in the land.

Item 4. S½ 7, S½ 8, 77-1-6 and SW 7, S½ 11, S½ 12, 77-2-6 be left as green zone.

Item 5. Additional lands on north side may be purchased back for green zone but no land be deleted from green zone.

Item 6. Any private lands recommended

for revestment should have some legal way of making Lands Branch aware of a possible sale and Lands Branch should have first chance of buying at a fair market price.

Proposals to the green zone could be from private or Crown land and the Committee feels that there should be no deletions from the green zone.

The Committee agrees with the land listed for revestment on p. 3.

The excerpt from the February 13th, 1973 meeting of the Conservation and Utilization Committee dealing with the Birch Hills Land Use Plan reads as follows:

Moved by Messrs. Dant and Nowicki that the Conservation and Utilization Committee recommends to the Alberta Lands and Forests the approval of the Birch Hills Land Use Study as prepared by the Land Use Assignment Committee.

LANDS RECOMMENDED FOR REVESTMENT

Twp.	Rge.	M					
77	24	5	NE20, & N½21 North of River, W½27 West of River Sec. 28, N½& SE 29, SE30, SE32, S½& NE33, N½& SW34 North & West of River N½35 North & West of River	77	2	6	N½3, N½4, Sec. 7, S½9, NW & SE19, S½20, S½21, S½25, S½26.
			SW2 West of River, Sec. 3 West of River, N½& SE 4, NE8 Sec. 9, W½10 West of River, N½& SW 15 West of River, SW16, SE17, E½21, N½& SE22, Sec. 23 North and West of River, NE25 North of River, S½26 West of River, NW27, SE28, N½33, N½& SW34, N½35, N½& SE36.	77	3	6	W½4, NE5, N½7, E½8, Sec. 9, Sec. 10, N½ & SW11, NW12, SE21, Sec. 22, Sec. 23, N½24, NW & SE28, N½29. NE & SW30.
78	24	5		78	3	6	NW17, NW18, NW19, W½20, SW26, Sec. 27, S½28. SE30. W½33.
				78	4	6	NW1, NE2, W½3, Sec. 4, Sec. 5, S½ & NE6, S½8, N½ & SW9, N½ & SE 10, S½11, S½ & NE 12, W½13, S½ & NE14, E½16, S½21, N½ & SW22, Sec. 23, SW & NE24, W½31, N½ & SW32, NW33, NE36.
77	25	5	S½& NW15, E½16.				
77	26	5	N½17, Sec. 20, W½21, Sec. 29, W½28, S½32, SW33.	77	4	6	NW4, N½5, Sec. 8 & 9, N½ & SW10, Sec. 15 & 16, SE17, NW19, S½ & NE22, N½23, S½ & NE25, S½26, N½30, Sec. 31, NW 32.
78	26	5	Sec. 20, N½32.				
78	1	6	NE24, E½25, N½& SE36.				
77	1	6	N½3, N½4, N½12, Sec. 13, Sec. 22, N½& SW 23, Sec. 24 S½& NE25, SW26, S½& NW27, N½&SE28, N½& SW30, S½32, S½33, SW 34.	77	5	6	Sec. 3, 10, W½14, S½ & NE15, SE22, Sec. 23, 24, 25, SE26, E½36.
			N½& SW28, SE29, Sec. 33.	78	5	6	E½25, E½34, NW35, SE36.

**PERMISSIVE USE AGREEMENT
BIRCH HILLS LAND USE PLAN
(August 1, 1972)**

1. No Agricultural Disposition

All Eb codings	Primarily watershed and wildlife habitat protection and recreation use. Watershed forestry in consultation with environment, wildlife and recreation.
Wp/Fw	Primarily ungulate production. Watershed forestry in consultation with wildlife.

2. Unimproved Grazing Only

ErWdAgFwRe	Primarily watershed and wildlife habitat protection and recreation.
ErWdFwAgRe	Unimproved grazing allowed by license or permit in consultation with environment, wildlife, forestry and recreation. Watershed forestry in consultation with environment, wildlife and grazing.
EdAg	Unimproved grazing.
EdWnReAg	Primarily wildlife production.
EdWnAg	Unimproved grazing in consultation with wildlife and recreation.
EdWdRdAg	
WdFeAg	Primarily ungulate production.
EdReFeAg	Unimproved grazing allowed in consultation with wildlife, forestry, and recreation.
WdReFeAg/Ew	
WpAgFe	Primarily wildlife production. Unimproved grazing allowed in consultation with wildlife and forestry.

3. Improved Grazing

EdWdApFa	Improved grazing in consultation with environment, wildlife and forestry. Coniferous timber on crown lands should be integrated in a woodlot program.
WdApFa	Primarily ungulate production.
WdFaAp	Improved grazing in consultation with wildlife and forestry only where forest cover is light and non-coniferous. Woodlot forestry in consultation with wildlife.
WdAp	Primarily ungulate production. Improved grazing in consultation with wildlife.

4. Arable Agriculture

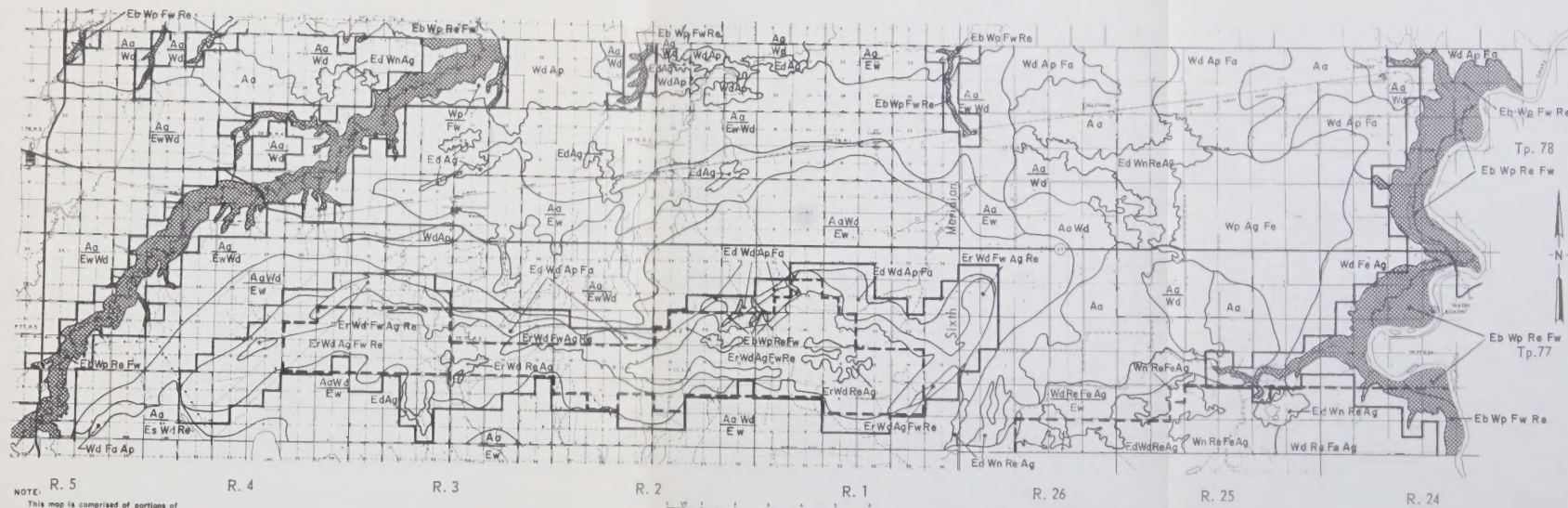
Aa/Wd, Aa/EwWd, AaWd/Ew	Primarily arable agriculture. Limited remaining natural cover should be retained wherever requested by wildlife and along watercourses in consultation with environment.
Aa, Aa/Ew	Arable agriculture.
AaWd	Primarily arable agriculture Limited remaining natural cover should be retained wherever requested by wildlife.
Aa/EsWdRe	Primarily arable agriculture. Along the shorelines of the lakes primarily waterfowl production and recreation.

Explanation of Symbols

AGRICULTURE		FORESTRY	
Aa	arable agriculture	Ft	timber production
Ap	improved grazing	Fa	woodlot purposes
Ag	unimproved grazing	Fw	watershed purposes
		Fe	erosion control purposes
WILDLIFE		RECREATION	
Wp	prime habitat	Rl	intensive
Wd	dispersal area	Re	extensive
Wn	nesting area	Rn	area to be left alone
Ws	staging area		no use allocation
Wf	fisheries	Rs	special site
Wm	miscellaneous interests eg. research projects		e.g. historic site
		Rc	recreation corridor
ENVIRONMENT			
Eh	headwaterlands		
Eb	riverbreaks		
Ew	watercourses		
Es	shorelands		
Er	recharge area		
Ed	discharge area		

The land use coding system lists specific uses in order or priority. Symbols in the numerator refer to the total area, while those in the denominator indicate specific uses on parts of the area. For example, FtWdRe/Ew stands for production forestry integrated with wildlife, recreation and environment interests. The latter are focused on parts of the area, namely the watercourses occurring within it.

BIRCH HILLS



NOTE: R. 5
This map is comprised of portions of
Alberta Base Maps 63M N.E. and
63N N.W. Therefore all symbolization
is standard for Alberta Base Maps.

LAND USE MAP

Alberta LANDS AND FORESTS Land Use Assignment Committee		map prepared by Land Use Assignment Section Technical Division
Recommended by	CHAIRMAN, L.U.A.C.	
Approved by	Deputy Chair, L.U.A.C. Dec 22	

AGRICULTURE

- A₁ ARABLE
- A₂ IMPROVED GRAZING
- A₃ UNIMPROVED GRAZING

ENVIRONMENT

- E₁ HEADWATERLANDS
- E₂ RIVERBREAKS
- E₃ WATERCOURSES
- E₄ SHORELANDS
- E₅ RECHARGE AREA
- E₆ DISCHARGE AREA

FORESTRY

- F₁ TIMBER
- F₂ WOODLOT
- F₃ WATERSHED
- F₄ EROSION CONTROL

RECREATION

- R₁ INTENSIVE
- R₂ EXTENSIVE
- R₃ AREA TO BE LEFT ALONE
- R₄ SPECIAL SITE
- R₅ RECREATION CORRIDOR

WILDLIFE

- W₁ PRIME HABITAT
- W₂ DISPERSAL AREA
- W₃ NESTING
- W₄ STAGING
- W₅ FISHERIES
- W₆ MISCELLANEOUS INTERESTS

RECOMMENDED USE OF CROWN LANDS

- AGRICULTURAL DISPOSITION AS SPECIFIED IN THE PERMITTED USE AGREEMENT
- NO AGRICULTURAL DISPOSITIONS
- LANDS REQUIRED FOR ENVIRONMENT CONSERVATION
- PROPOSED GREEN ZONE

